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Beryllium minerals in Cornwall and Devon: helvine, genthelvite, and danalite.

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Summary. Helvine and genthelvite are recorded for the first time in Britain; of the former, three occurrences in Cornwall and one in Devon, and of the latter, one occurrence in Cornwall, are described. British danalite has hitherto been represented by two old specimens with the vague locality 'Redruth', Cornwall; occurrences at four Cornish localities are described, and a further Cornish locality is provided by two old specimens previously labelled as garnet. Partial chemical analyses for the helvine, genthelvite, and danalite specimens are presented; helvine and genthelvite occur in pyrometasomatic-hydrothermal deposits in metamorphosed calcareous sediments and, in one instance, in greenstone; danalite in hydrothermal deposits or lodes in metamorphosed greenstone; the parageneses of the three minerals are discussed.

THE helvine group of minerals, $(Mn,Fe,Zn)_4Be_3Si_3O_{12}S$, comprises helvine, genthelvite, and danalite, which are the manganese-, zinc-, and iron-rich members respectively of a three-component system. None of the pure end-members is known to occur in nature; iron and manganese appear in all the recorded analyses, whereas zinc appears in about half of them although probably present in the remaining specimens in trace amounts.

A comprehensive account of occurrences of helvine and danalite at Iron Mountain, New Mexico, U.S.A., together with a review and discussion of the whole helvine group, has been given by Glass, Jahns, and Stevens.[1] As shown in their paper, and in subsequent records, helvine has been found more widely than danalite, its environments including granite- and syenite-pegmatites (rare), hydrothermal veins,[2] and—more frequently—in contact-metamorphic deposits, skarns and tactites.

[1] J. J. Glass, R. H. Jahns, and R. N. Stevens, Amer. Min., 1944, vol. 29, p. 163.

[2] See also H. Neumann, Norsk Geol. Tidsskr., 1950, vol. 28, p. 234 [M.A. 11–511].

Danalite has been found in granite, but mainly in contact-metamorphic skarns and tactites. Genthelvite has only been found in pegmatites hitherto, and but five occurrences, three of them as single crystals, have been recorded.

Minerals of the helvine group are frequently associated with members of the garnet group, and the two may easily be confused in the field and in the hand specimen. Not only do both helvine and danalite, and genthelvite to a smaller extent, show similar variations of colour, mainly yellow and red shades but occasionally greyish or greenish, to those of garnets occurring in similar calcareous environments, but their crystals also can be of modified octahedral or dodecahedral habit. Only when in simple tetrahedra can they be readily recognized, but they are more frequently massive, or in anhedral grains embedded in the matrix; like garnet they are isotropic, and have refractive indices in the grossular range. In the past, the recognition and identification of minerals of the helvine group has, for these reasons, been by no means easy; J. W. Gruner,[1] however, more recently devised a simple and rapid staining test for members of the helvine group, which may also be used for detecting even one or two minute grains in a large amount of crushed material or in a hand specimen; the identification may then be completed by X-ray powder-photograph or by partial chemical analysis.

Previous occurrence of danalite in Cornwall.

Danalite is the only member of the helvine group hitherto recorded from Britain, and of two specimens in the British Museum mineral collection, one, B.M. 39955, was bought from R. Talling, the Cornish mineral dealer, in 1864 as 'Garnet, large tetrahedrons with quartz and mispickel, Redruth, Cornwall', and was described by Miers and Prior[2] in 1892. A second specimen, B.M. 74451, is closely similar in appearance and was bought from F. H. Butler in 1894;[3] according to Miers, the locality is also 'Redruth', Cornwall, and fragments from this specimen have been examined by Glass *et al.* (loc. cit.). Miers and Prior also described some small yellow tetrahedra, and one partly red and partly yellow, occurring in cavities in the red danalite, and suggested that this

[1] J. W. Gruner, Econ. Geol., 1944, vol. 39, p. 444.

[2] H. A. Miers and G. T. Prior, Min. Mag., 1894, vol. 10, p. 10.

[3] Talling had died shortly before this, and F. H. Butler, who was his son-in-law, had taken over all his stock of minerals; from the similarity of the two specimens, there is little doubt that they were both originally acquired by Talling and from the same source.

indicated the presence of both red danalite and yellow helvine; re-examination of the specimen has failed to reveal any of these crystals, although some parts of the larger crystals have a yellowish appearance, but they may well have been simply colour-variations of the danalite. Yellow varieties of danalite were not known in 1892, but have since been described by Glass *et al.* It is unfortunate that the locality 'Redruth' is so vague; as used by Talling it covered an area of some 30 square miles, and so it is virtually impossible to assign the specimen to a particular mine, especially as, at the time it was collected, there were probably nearly a dozen mines working in the Camborne–Redruth area from which, with the knowledge now gained from the new occurrences, it might have come. Four other specimens of Cornish danalite, from old Cornish collections and previously labelled as garnet, are now known and are described below (pp. 932–3).

New occurrences of helvine, genthelvite, and danalite in Cornwall and Devon.

The two large specimens of danalite in the British Museum collection, despite the absence of locality detail, have always suggested that more of the mineral existed originally and might still be found. I felt sure, from recent accounts of the more usual environments of both danalite and helvine, that there were a number of localities and areas in Cornwall and Devon where these minerals might be discovered; it also seemed probable that danalite, in particular, might have been mistaken in other cases for reddish-brown garnet, by no means uncommon in the Camborne–Redruth area and elsewhere, and that helvine might have been mistaken for scheelite or yellow garnet.

My investigations at a number of possible localities, together with a re-examination of several unidentified specimens that I had collected over a number of years, have now resulted in four new finds of helvine, one of genthelvite, and four of danalite; a fifth new locality for danalite is provided by two old specimens in Sir Arthur Russell's collection.

In all these cases, except for two of Sir Arthur's old specimens, preliminary examination by Gruner's staining test established the minerals as members of the helvine group; this was followed by X-ray powder-photograph study and, in most cases, by spectrographic examination, carried out by Dr. S. Ross Taylor, to whom my thanks are due. Through the courtesy of the Keeper of Minerals, Dr. G. F. Claringbull, partial analyses, to obtain where possible the iron-, manganese-, and zinc-contents of the various specimens, have been carried out in the Mineral Department of the British Museum (Natural History), to whom the specimens have now been handed over; my thanks are especially due to the Keeper, to Mr. P. G. Embrey, and to Mr. D. I. Bothwell by whom the analyses were actually

made. Particulars of the figures obtained are given in table I below, together with relevant figures obtained for the two British Museum specimens by Mr. Bothwell and by Miers and Prior.

Helvine from Red-a-ven Brook mine, Meldon, Okehampton, Devon. This locality[1] is situated about $\frac{1}{2}$ mile south-south-east of the large British Railways quarry at Meldon, and lies on the northern bank of the Red-a-ven about $\frac{1}{2}$ mile upstream from its confluence with the West Okement river, and some $\frac{2}{3}$ mile from the granite margin. The country-rocks consist of metamorphosed Culm-measure sediments, and the mine, which was little more than a trial, lies in the narrow outcrop of a series of impure limestones and calcareous shales of Lower Culm age, which have been intensely folded and overturned and now dip very steeply to the north. Two shafts were sunk, evidently on mineralized bands in the calcareous series, and small dumps adjoining them contain skarn-assemblages of hedenbergite, diopsidic pyroxenes, green and brown garnet, idocrase, wollastonite, calcite, some fluorite, and chloritic minerals; through this are disseminated much pyrrhotine and löllingite, traces of arsenopyrite, as well as chalcopyrite and blende, a little galena, and some scheelite. The latter occurs at other, similar metamorphic deposits in this area, as at Ramsley mine (where it has also been found by Sir Arthur Russell), at Ford mine, South Tawton, and at Meldon Limestone quarry, but its occurrence in the Okehampton district has not been previously recorded.

Helvine has been found in some skarn material collected in 1948 at Red-a-ven Brook mine, as minute grains or occasionally tetrahedral crystals (up to 1 mm.) of a very pale primrose-yellow colour, in granular intergrowths of dark-brown blende, calcite, garnet, and a little colourless fluorite. This material was the first of the various new occurrences to be re-examined, and I detected the helvine by Gruner's staining test; its identity was confirmed by a spectrogram, and by X-ray powder-photograph which showed almost exact agreement with those of bright sulphur-yellow tetrahedra of helvine from Schwarzenberg and from Breitenbrunn, both in Saxony, from specimens (O.U.M. 20590 and O.U.M. 11353 respectively) in the Oxford University collection. Compositional data of the Red-a-ven Brook helvine are given in table I.

Helvine from Wheal Cock, St. Just, Cornwall. In 1949 I found very small amounts of a pale yellow waxy mineral, suggestive of scheelite, in some massive, rather decomposed chloritic material on the dumps

[1] It was briefly referred to, as an exploration of Black Down in line with Wheal Forest, by Warington Smyth in Trans. Roy. Geol. Soc. Cornwall, 1878, vol. 9, p. 40.

adjoining the two main shafts immediately south of Wheal Cock Zawn; other minerals found in the same matrix, at the same time, include phenakite, bertrandite, herderite,[1] and apatite. The pale yellow, waxy mineral has proved to be helvine, but the quantity present has, unfortunately, not been sufficient to allow of a partial analysis being made; spectrographic and X-ray examination, however, have shown that it is a manganese-rich member. Only a few grains, mostly rather decomposed, are present, scattered here and there through the matrix, and closely resemble scheelite, which has since been found here by Dr. K. F. G. Hosking, of the Camborne School of Mines, and by myself, as pale yellow, bipyramidal crystals (up to 6–7 mm.) in massive chlorite.

Wheal Cock lies entirely in metamorphosed greenstone, and material on the dumps includes not only sulphide-bearing quartz-chlorite and other veinstone from the lodes, but also much country-rock with, *inter alia*, massive chlorite, axinite, garnet, calcite, magnetite, arsenopyrite, and metamorphic skarn-type assemblages. The matrix of the helvine is more characteristic of the metamorphic material than that of the lodes, and in view of the occurrence of phenakite and herderite in the same matrix, it may be significant to note that C. Palache[2] found phenakite as an alteration-product of danalite at Gloucester, Massachusetts. The bertrandite is unquestionably derived from alteration of the phenakite, and here also this latter may be an alteration-product of helvine; the herderite, a calcium beryllium phosphate, could have formed during one or other of these later, hydrothermal stages. The occurrence of phenakite, with adularia-habit orthoclase, quartz, cassiterite, and scheelite, was recorded by Sir Arthur Russell[3] in some vein-material from a lode that outcrops in Stamps and Jowl Zawn, 200 yds. to the north, in the northern part of the mine. In this latter occurrence, all the associated minerals are of characteristic hydrothermal lode formation, and have been found in other lodes in the area. The association is, moreover, distinct from those now described, which are almost certainly of pyrometasomatic origin. It may be noted that both here and at other nearby mines, rhodochrosite, much manganiferous calcite, and other manganese minerals were present, which explains the formation of the manganese-rich member, helvine, in the environment of the greenstone.

Helvine from Wheal Betsy, Tremore, Lanivet, Cornwall. Some 250 yds.

[1] A. W. G. Kingsbury, Min. Mag., 1958, vol. 31, p. 816.
[2] C. Palache, Amer. Journ. Sci., 1907, ser. 4, vol. 24, p. 252.
[3] A. Russell, Min. Mag., 1920, vol. 19, p. 19.

north of Tremorebridge, 2 miles west of Lanivet, and on the east side of the stream, there is a large, now disused, quarry in part of the main outcrop of a belt of metamorphosed calcareous sediments to which the name 'calc-flintas' was given by the Geological Survey. This belt extends round the northern fringe of the St. Austell granite from near Lostwithiel westwards to St. Columb; the rocks have been much folded and now dip very steeply to the north. In addition to being thermally metamorphosed, these upturned rocks have, in many places, been fractured or faulted along the bedding-planes, affording channels up and along which pyrometasomatic and hydrothermal agents have given rise to further alteration and mineralization. In a number of instances, highly inclined mineralized bands or beds such as these have erroneously been described and referred to as 'lodes'. Mineralization phenomena in this area in general, and in these altered calcareous rocks in particular, had suggested that it was one of the most likely in which minerals of the helvine group might occur; four such occurrences have, in fact, now been found.

This quarry at Tremore was referred to by Barrow and Thomas[1] in an account of metamorphic minerals in calcareous rocks in the Bodmin area, and they mentioned the occurrence, *inter alia*, of yellow garnet and, 'in the refuse from an old pit sunk in a copper-vein at the southern end of the quarry', of certain 'pneumatolytic' minerals, massive chalcopyrite, fluor, well-crystallized 'talc', zinc-blende, and masses of 'peculiar' chlorite in the form of 'peach'. Though little is known or recorded about it—and some of the data are certainly erroneous—a small mine, known as Wheal Betsy, was at one time worked here. Two east–west 'lodes', a few feet apart in the 'calc-flintas', were said to have been opened up by adits, driven east from near stream-level, and by a shaft, probably on the northern 'lode', on the valley side.[2] The site of this shaft, which is not specifically mentioned, as such, by Barrow and Thomas, is still visible just outside the southern edge of the quarry, but a short distance to the west of it, nearly at stream-level, there is an old overgrown pit, which may be that to which they referred. In and around this pit, mineralized calc-flinta occurs with massive granular chlorite, traces of fluorite, chalcopyrite, and blende, and among this material I collected a specimen of pale grey-green, scaly, crystallized chlorite with quartz and calcite, in which were implanted several small, bipyramidal,

[1] G. Barrow and H. H. Thomas, Min. Mag., 1908, vol. 15, p. 113.

[2] Compare the account in Memoirs of the Geol. Survey; the Metalliferous Mining region of South-West England, 1956, vol. 2, p. 513.

pale wax-yellow crystals of scheelite. This scaly chlorite may be the 'talc' mentioned by Barrow and Thomas; the pit, from its position, appears more likely to have been caused by a collapse of one of the adits, which must have been quite shallow.

Just below the site of the shaft there is a small, overgrown dump containing similar material to that round the 'pit'; both the calc-flintas and the dark, granular chlorite, however, contain rather more disseminated chalcopyrite, blende, and fluorite, with the addition of pyrite and calcite, and Dr. Hosking informs me that, on the only occasion he visited this locality, he also found traces of scheelite. Examination of a large amount of material, obtained on the surface and by digging into the dump, yielded several specimens and fragments of a yellowish mineral which here and there showed small crystals closely resembling tetrahedra; this mineral has now proved to be helvine. Though rather iron-stained, the helvine is mainly wax-yellow in colour, some parts being slightly more brownish-yellow and translucent, and except for the small, characteristic tetrahedral crystals, might readily be mistaken for yellow garnet or scheelite. A partial analysis is given in table I.

It seems clear from an examination of the locality that there are no true lodes at all, and that the mineralization consists of bands, of pyrometasomatic and hydrothermal origin, adjacent to fractures in the highly inclined 'calc-flintas'.

Helvine from Bodmin Wheal Mary, Lanivet, Cornwall. About $\frac{2}{3}$ mile north of Lanivet, and some 250 yds. south of Hooper's Bridge, there are old mine-workings, on both sides of the stream, formerly known as Bodmin Wheal Mary. The main, or Wheal Mary, section lies on the east side of the valley, and was worked from an engine-shaft and two adits; the other section, later known as Wheal Ding, lies about 300 yds. to the west on the other side of the valley and was worked from two shafts and some opencast workings in Bodwannick Wood.

Wheal Mary section lies at or near the junction between slaty killas and part of the main outcrop of the 'calc-flintas', here striking east–west and again dipping very steeply to the north; Wheal Ding section appears to lie almost entirely in the 'calc-flintas'. The Survey Memoir (op. cit., vol. 2, p. 515) gives a short account of the mine, and refers to a main east–west quartz-pyrite lode crossing the river and showing, in Wheal Ding, a quartz leader in association with fluccan[1] at the hanging wall, south of which the calc-flintas were impregnated with small crystals of

[1] Flucan, fluccan, or flookan—a stiff clay found in faults and especially in 'cross courses'.

blende. This account is difficult to reconcile with the field-evidence present at the locality, and in examining the evidence the author appears to have overlooked the essentially metamorphic character of the main mineralization.

The locality was very fully examined in 1958; near the engine-shaft at Wheal Mary, a few small piles of iron-stained quartz were found, but these are entirely barren, and from the chalcedonic and other characteristics of the quartz it is evident that they came from a much later infilling, almost certainly in a fault. The occurrence of fluccan, due to renewed movement along the fault, would be further evidence of this, and it is unlikely that mineralization from this vein could have impregnated the calc-flintas in the manner shown *in situ* and by the material on the rest of the dumps.

Apart from some killas on the Wheal Mary dumps, the waste material in both sections consists wholly of calc-silicate rocks or assemblages; no trace of quartz lode-material could be found in Wheal Ding. The calc-silicate material comprises a great deal of fine-grained 'calc-flintas' but also includes large amounts of massive, compact to granular, pale green to yellow and brown garnet, green amphiboles, green and greyish-green pyroxenes, with smaller quantities of wollastonite, calcite, fluorite, axinite, magnetite, pyrrhotine, and chloritic minerals. Disseminated through the calc-flintas and these skarn assemblages, especially in the garnet, are much brown blende, some chalcopyrite, galena, and other sulphides, among which bornite and alabandine (MnS) have been identified from the Wheal Mary section. Rather more chalcopyrite and galena occur here than in Wheal Ding, where blende is predominant, and where a little scheelite also occurs. Much of the weathered material is stained by manganese oxides, and brown botryoidal rhodochrosite has been found investing some of it. No trace of the 'calamine' and 'franklinite' mentioned in the Survey Memoir could be found. This is only the second known locality in Cornwall for alabandine. These characteristic minerals and assemblages indicate clearly that there has been extensive pyrometasomatic-hydrothermal mineralization in the 'calc-flintas', no doubt along fractures in the highly inclined beds as at Wheal Betsy and elsewhere in this area.

Among these skarn assemblages in Wheal Ding, helvine has also been confirmed. The mineral is wax-yellow in colour, and closely resembles some of the yellow garnet; it forms a granular intergrowth with brown blende, calcite (largely corroded), traces of a green pyroxene, and a little galena and colourless fluorite. Where originally in contact with

some of the calcite, small tetrahedra (up to 2 mm.) project from irregular surfaces of some of the helvine. The material formed a roughly lens-shaped pod in the mineralized 'calc-flinta' and came from a large, weathered block that was dug out of the dump by the upper shaft in Bodwannick Wood. The composition of this helvine is shown in table I.

Genthelvite from Treburland, Altarnun, Cornwall. An account of the old Treburland manganese mine was given by Sir Arthur Russell[1] in 1946, but within recent years the site has been ploughed up and obliterated.

The mine was primarily worked for the oxidized manganese ore present in two pockets which lay within a belt of calcareous sediments and associated greenstone intrusions, only about 120 yds. (at surface) from the margin of the Bodmin Moor granite. The two pockets had, no doubt, originally consisted of bedded deposits of iron and manganese carbonates, and metamorphism by the adjacent granite produced a complex assemblage of iron and manganese silicates and other minerals. A small dump, near one of the shallow adits by which the deposits were worked, consisted almost entirely of the hard unoxidized portions that had been rejected.

A short distance to the north of the small 'manganese' dump, and quite separate and distinct from it, a small pit had been opened, possibly in search of other pockets of ore. This pit, however, only exposed the country-rocks, in which metamorphism by the granite produced a different assemblage of minerals. The calc-silicate rocks exposed in this pit include streaks and bands of a dark grey to greyish-green colour, which almost certainly represent inclusions or veins of sheared, highly metamorphosed greenstone; within these rocks are other streaks, veins, bands, and inclusions of pink to cinnamon-coloured calcium-iron garnet, diopside, wollastonite, idocrase, axinite, calcite, chlorite, pyrite, pyrrhotine, and zeolitic minerals of later formation, with traces of arsenopyrite, galena, and molybdenite.

On a visit to Treburland in 1948, with Sir Arthur Russell and Dr. G. F. Claringbull, specimens of various minerals were collected, and while examining some of the exposures in the overgrown pit, my attention was drawn to a small band or vein-like inclusion in some of the darker material, which, in addition to cinnamon-coloured garnet, calcite, chlorite, and traces of galena and molybdenite, contained one or two small blebs of a mineral having a more distinct rhodonite-pink colour. Apart

[1] A. Russell, Min. Mag., 1946, vol. 27, p. 221.

from the difference in colour, and a more greasy lustre, there was little to distinguish this pink mineral from garnet. As many fragments and pieces of this inclusion as could be extracted were collected, and more recent examination of samples of it by Gruner's staining test showed that the small pink blebs gave the reaction for a helvine-group mineral. A powder-photograph showed a pattern similar to that of danalite, but with slightly different spacings, and from the results of a spectrogram, which showed a fairly high iron-content and low manganese, but a certain amount of zinc, it was provisionally considered to be danalite. Partial chemical analysis, however, has proved that zinc is, in fact, predominant, and that, as the figures in table I show, the mineral is an iron-rich genthelvite.

Danalite from the 'New Tolgus shaft', Redruth, Cornwall. The circumstances leading up to the sinking of this shaft[1] between the years 1923 and 1927, and its final abandonment at a depth of 2 000 feet, have been described in detail; during the sinking, a careful log was kept and details have been published, with a full section, by J. C. Davey.[2] Between 700 ft. and 1 000 ft. from surface, the shaft passed through a large body of metamorphosed greenstone some 278 ft. thick, which was considerably mineralized and carried much axinite in the upper parts and large amounts of red garnet in the lower parts, together with chlorite, arsenopyrite, pyrrhotine, chalybite, and other minerals. Another body of mixed greenstone and slate was encountered between 1 800 ft. and 2 000 ft., and a number of small mineralized veins were also cut at various horizons.

In 1937 I had visited the site of this shaft, when there was still a large amount of material on the dumps, and when, from its position relative to the shaft-head, it was possible to judge approximately from what depth it was obtained. Among large amounts of altered greenstone, the occurrence of axinite near the shaft and of much red garnet farther away suggested that this latter material originally came from the lower parts of the main body. Many large bodies of greenstone occur in this area, some of them having been encountered only during mining operations, and garnet is of common occurrence in them. It varies from cinnamon-colour to dark brownish red and is almost always massive, forming veins, lenticles, and often considerable masses. It is frequently

[1] The site of the shaft (now cemented over) is 700 yds. north of the western corner of the Redruth Union (Public Assistance) Building.

[2] J. C. Davey, Trans. Roy. Geol. Soc. Cornwall, 1927, vol. 15, p. 439; idem, ibid., 1948, vol. 17, part 7 (for 1947), p. 361 and section.

associated with bands or rims of green diopsidic pyroxene and occasionally with wollastonite.

From among some of this material, one specimen, *inter alia*, was collected primarily by reason of its rather unusual appearance; it consisted of a small piece, some 6 cm. long and 4 cm. wide, of a glassy, massive mineral, closely resembling the darker varieties of garnet, but having a peculiar, dark, mahogany-red colour, associated with it being some dark chlorite, and traces of arsenopyrite, pyrite, chalcopyrite, blende, calcite, and fluorite. It was clear that it had been derived from the greenstone, but the association suggested that it had almost certainly come from a mineralized vein. This dark-red mineral has now been proved to be danalite; its composition is given in table I.

Danalite from Levant mine, St. Just, Cornwall. The lodes in the well-known Levant mine passed westwards from granite, first into hornfelsed killas, and then into metamorphosed greenstone. Throughout the St. Just area, metamorphic minerals occur in large amounts, particularly in the altered greenstones, and include large amounts of axinite, garnet, epidote, amphiboles, pyroxenes, and various skarn assemblages, with magnetite and pyrrhotine. In addition to the normal quartz-chlorite veinstones, the lodes at Levant sometimes enclosed massive red garnet associated with chalcopyrite and pyrite. Examples of this and other varieties of garnet, with associated species, could at one time be found round the shafts and on the dumps adjoining Levant Zawn and Cockle Zawn. Disseminated white scheelite, together with calcite showing a pink fluorescence, occurs in some of this red garnet, and among specimens collected in 1948 were several with an unusual glassy appearance and darker, mahogany-red colour similar to that of the Tolgus material. Like much of the garnet, this darker red mineral contains disseminated chalcopyrite and pyrite, and it was also accompanied by a little chlorite, arsenopyrite, blende, and traces of fluorite; it also has been proved to be danalite and its composition is shown in table I.

Danalite from Tretoil mine, Lanivet, Cornwall. This mine is not far from Bodmin Wheal Mary, and is situated about 2 miles east of Lanivet and the same distance south of Bodmin. It lies just outside the margin of the eastern part of the St. Austell granite, in country-rocks consisting of hornfelsed killas and intrusions of greenstone. Two main lodes, coursing east-north-east, were worked and both of them cut through the greenstones in several places. The veinstone is principally quartz and chlorite, and the lodes carried a little cassiterite in depth, but mainly chalcopyrite and pyrite, with minor blende and galena and some arseno-

pyrite in places. Where the lodes cut the greenstones, chlorite is more abundant, and in some parts, especially in the south vein, there is much massive, fine-grained magnetite; garnet, specular hematite, ilvaite, and other metamorphic minerals have also been found during the course of numerous visits. On a visit in 1952, primarily in search of the rare yttrium phosphate, churchite,[1] I had concentrated on three particular shafts on the southern lode, all of which had been sunk through greenstone. In some of the material derived from William's shaft, 300 yds. north-north-east of Tretoil Farm, and the middle one of the three, I collected a specimen of chloritic veinstone that contained in addition to arsenopyrite, pyrite, chalcopyrite, quartz, and some blende, a small amount of a compact, massive, brownish-red garnet-like mineral. The outer parts of this mineral had a bleached, slightly yellowish, granular appearance, but internally it was more glassy and had a darker, columbine-red colour; where in contact with some of the chlorite, small triangular outlines suggested crystals of tetrahedral habit. This mineral has also been confirmed as danalite; it has a slightly higher zinc content than the others (table I).

Danalite from Wheal Maudlin, Lanlivery, Cornwall. Three specimens of danalite have been confirmed from this locality, which lies 1½ miles south-east of Tretoil and about 2 miles north-west of Lostwithiel. One of these specimens was collected by myself at the mine, on a visit there with Sir Arthur Russell; the other two are in Sir Arthur's collection, and had originally been labelled as garnet from Wheal Maudlin, one formerly having been in the collection of Philip Rashleigh[2] (1729-1811), of Menabilly, near Fowey, and the other in a collection at one time belonging to the Fox family, of Falmouth. Both these well-known collections dated back to the end of the eighteenth century.

Sir Arthur's two specimens came to light when I was showing him the danalite from Tolgus, Levant, and Tretoil early in 1958, during which he had remarked that he had in his collection some old specimens, labelled as garnet from Wheal Maudlin and another locality, which, as far as he could remember, were similar in appearance. He also mentioned that the red colour of the Wheal Maudlin specimens had puzzled him, as the garnet from there was otherwise always of brown to yellowish shades. On comparing these old specimens with my own new examples, there was no doubt as to their similarity, and they have been subse-

[1] See A. W. G. Kingsbury, Min. Mag., 1956, vol. 31, p. 282, for its rediscovery.

[2] For a short account, see Sir Arthur Russell, Journ. Roy. Inst. Cornwall, 1952, p. 1.

quently examined in the Mineral Department of the British Museum and confirmed as danalite.

Later that same year, Sir Arthur and I visited Wheal Maudlin together, and during an intensive search, I obtained a small specimen of danalite *in situ* in some lode material on the burrows adjoining one of the old shafts. Wheal Maudlin is a very ancient mine and lies just outside the granite margin: the country-rock is mainly killas, but in the northern part of the mine there is a large intrusion of greenstone, both killas and greenstone being metamorphosed. Records are very incomplete, but several veins, with a general east–west trend, were worked, and westwards they extended into the greenstone. The greenstone–killas contact passed through the Engine shaft, 300 yds. south-east of Maudlin Farm, about 50 fathoms below surface, and also through or close to Benson's or Whim shaft, 100 yds. south-west of Engine shaft. The mine was not a large producer, but the mineral assemblage was complex, and included cassiterite, scheelite, arsenopyrite, pyrrhotine, chalcopyrite, pyrite, blende, galena, fluorite, garnet, much chlorite, and quartz, and many other species.[1]

Our search was concentrated mainly on Benson's shaft, where the material on the burrows was almost entirely derived from the greenstone, and where, with the exception of cassiterite and scheelite, we found all the minerals mentioned above, and several others. Owing to long exposure, much of the material is weathered or superficially iron-stained, but internally most of it is remarkably fresh. During the course of examining many samples of the chloritic and other vein-stuff, removal of a corner from one of them revealed traces of a massive mineral with the characteristic, dark columbine-red colour, and further breaking of the matrix yielded, in two portions, a small mass of danalite, some 6 cm. by 5 cm. The chlorite associated with this specimen shows a curious dark, greenish bronze colour, and is present in other material found at this mine; a similar chlorite is found on some of the other specimens of danalite, and it has been found elsewhere where veins cut the greenstones. Other minerals associated with this danalite from Wheal Maudlin are pyrite, arsenopyrite, chalcopyrite, blende, quartz, and fluorite; the composition is shown in table I.

Danalite from Wheal Clinton, Mylor, Falmouth, Cornwall. This is the fifth distinct locality from which danalite has now been confirmed; two

[1] It was best known for some of the mineral specimens it produced, including, especially, those of chalybite, francolite, cronstedtite, and pseudomorphs of wolframite after scheelite.

old specimens, which are identical and were originally labelled as garnet from Wheal Clinton, were in Sir Arthur Russell's collection, both of them having formerly also been part of the Fox collection.

The specimens show the characteristic dark, columbine- to mahogany-red colour, but they are slightly decomposed, appearing cloudy and granular, and they contain a great many minute inclusions of a black substance; chlorite is associated with them but no sulphides are visible. In these characteristics they are somewhat distinct from all the other specimens.

Wheal Clinton is situated near Trefusis Point, Mylor, opposite Falmouth, and lies just within the metamorphic aureole surrounding the south-eastern part of the Carnmenellis granite. It was a little-known mine, worked for a short time between 1850 and 1858, primarily for lead, and of the two lodes present only one, the north lode, was said to be workable, the minerals occurring in it being recorded as galena and blende, with some chalcopyrite and calcite. This lode, trending north-east, lay partly in killas and partly in or against an intrusion of metamorphosed greenstone, where it was said to be disordered. The environment is thus the same as at the other danalite localities. The specimens have

Table I. Manganese-, zinc-, and iron-contents of helvine, genthelvite, and danalite from Cornwall and Devon.

Mineral.	Locality.	B.M. No.	FeO.	MnO.	ZnO.
Helvine	Red-a-ven Brook	1956,85	8·7	32·0	13·2
,,	Wheal Betsy, Tremore	1958,537	11·8	41·9	n.d.
,,	Bodmin Wheal Mary	1959,626	7·4	39·3	3·5
Genthelvite	Treburland	1959,627	19·8	4·4	25·9
Danalite	New Tolgus shaft	1958,534	38·8	7·1	4·9
,,	Levant mine	1958,533	37·3	6·7	n.d.
,,	Tretoil mine	1958,536	32·0	9·0	8·4
,,	Wheal Maudlin	1958,535	33·4	9·2	n.d.
,,	Wheal Clinton	—	39·5	6·7	5·6
,,	'Redruth'	74451	33·8	12·1	6·0
,,	'Redruth'	39955	32·1	7·8	5·2
,,	'Redruth'	39955	37·5	11·5	4·9
Helvine	Wheal Cock	—	Insufficient material was available for analysis, but a qualitative spectrographic determination showed major Mn, moderate Fe, trace of Zn.		

Analyses by D. I. Bothwell, except the last, which is from Miers and Prior (1894). The first eight specimens were collected by the author; the Wheal Clinton specimen is from Sir Arthur Russell's collection; B.M. 74451 was bought from F. H. Butler and B.M. 39955 from R. Talling.

been identified as danalite in the Mineral Department of the British Museum, and the composition is shown in table I.

Consideration of the compositions in relation to the associations.

Apart from other factors in the environment that undoubtedly control the formation of helvine-group minerals, the availability and concentration of manganese, zinc, and iron are those upon which the formation of any particular member of the group depends. The beryllium-bearing solutions giving rise to these minerals in Cornwall and Devon may have carried, in some instances, some of the elements required, but it is clear that local conditions at many of the localities also had a direct influence on the mineral formed.

Three of the occurrences of helvine are in altered calcareous sediments that carry appreciable amounts of manganese, those at the nearby localities of Wheal Betsy (Tremore) and Bodmin Wheal Mary being somewhat richer in this element, and having a number of other manganese minerals associated with them. The helvine from Red-a-ven Brook mine shows the lowest manganese-content, 32·0% MnO, of those analysed, but a notably high zinc content, 13·2%; those from Wheal Betsy and Bodmin Wheal Mary have the highest manganese, 41·9 and 39·3 respectively, with little or no zinc; all of them have a moderate iron-content. As was indicated by Glass *et al.* (loc. cit.), in the pure helvine end-member of the group, the theoretical content of MnO is 51·12, and among all the specimens of natural helvine so far analysed, an example from Amelia, Virginia, with 51·64 MnO, shows the highest, while the helvine from Iron Mountain, with only 26·51 MnO, but with 18·02 FeO, shows the lowest. At the Wheal Cock occurrence, in greenstone, the conditions indicate that there was a local concentration of manganese, which seems to have been somewhat more readily available than iron, and though there was insufficient material for an analysis, the X-ray powder pattern and spectrographic examination, which showed major amounts of manganese, a good deal of iron, but only traces of zinc, indicated that the mineral was helvine rather than danalite.

The genthelvite from Treburland, while showing a predominance of zinc, has a rather high iron-content and, surprisingly, only a small amount of manganese. The calcareous sediments in the country-rocks, among which the mineral occurred, are low in manganese and contain no manganiferous minerals other than axinite, in contrast to the high

concentration of manganese minerals in the two deposits, or pockets, close by, which were worked in the old mine. The high iron-content, however, can almost certainly be attributed to the influence of the metamorphosed greenstone intermixed with the calcareous sediments, and with which the genthelvite was intimately associated. In this part of the locality, blende, which is present in small amounts in the manganese deposits, is notably absent, and whatever zinc there was appears to have been introduced at a relatively late stage in sufficient concentration to have been more readily available for the formation of the genthelvite, in spite of the influence of the greenstone. The occurrence of the zinc-rich member of the group under the conditions at Treburland is, therefore, the more remarkable. Pure genthelvite should contain 54·54% ZnO, and of the few analysed specimens, the original single crystal from Colorado contains the highest amount, 46·2% ZnO, with 6·8% of FeO. In two of the recent new records of genthelvite, one from the Kola Peninsula (E. M. Eskova, Min. Abstr. **14** 53) was a manganese-rich variety, with ZnO 40·0 and MnO 10·21, and the other, from Northern Nigeria (O. von Knorring and P. Dyson, Amer. Min., 1959, vol. 44, p. 1294) was also an iron-rich variety, with ZnO 40·56, FeO 11·73, and MnO 1·72. Both these occurrences, however, were in pegmatites.

The most marked influence of the local conditions is shown by the Cornish occurrences of danalite, all of which are in veins intimately associated with greenstones. Though the figures in table I show slight variations from locality to locality, the specimens are all consistently high in iron and there can be no doubt that this is due to the availability and influence of the iron in the greenstones. The pure danalite end-member should contain 51·44% of FeO, and hitherto (see Glass *et al.*) the highest iron-content of analysed natural examples has been given as that found by Miers and Prior for the old specimen from 'Redruth', B.M. 39955, namely 37·53% FeO. In the new Cornish occurrences, as is shown in table I, FeO ranges from 32·0% at Tretoil (where zinc reaches 8·4%) to 38·8% in the Tolgus material and 39·5 in that from Wheal Clinton. The figures recently obtained for the two old specimens in the British Museum differ from those given by Miers and Prior; in the case of B.M. 39955, they are somewhat low, but Prior's figures for iron, manganese, and zinc together amount to 53·93, which, on the face of it, is rather high. It is possible, however, that different parts of the specimen may show variations due to alteration.

In spite of the absence of details of the occurrences of the two old specimens of danalite from 'Redruth', there is now little doubt that

they also originally came from a lode or deposit in one of the greenstones in the Camborne–Redruth area.

A summary of the environments and localities is given in table II.

TABLE II. Summary of environments and localities of helvine, genthelvite, and danalite in Cornwall and Devon.

Environment.	Mineral.	Locality.	Associated granite.
Pyrometasomatic deposit in metamorphosed calcareous sediments	Helvine	Red-a-ven Brook mine, Meldon, Devon	Dartmoor
	Helvine	Wheal Betsy, Tremore	St. Austell
	Helvine	Bodmin Wheal Mary, Lanivet	St. Austell
Pyrometasomatic deposit in metamorphosed greenstone (manganese locally present)	Helvine	Wheal Cock, St. Just	Land's End
Pyrometasomatic deposit in mixed calcareous sediments and greenstone	Genthelvite	Treburland, Altarnun	Bodmin Moor
Hydrothermal veins or lodes in metamorphosed greenstone	Danalite	New Tolgus Shaft, Redruth	Carn Brea
	Danalite	Levant mine, St. Just	Land's End
	Danalite	Tretoil mine, Lanivet	St. Austell
	Danalite	Wheal Maudlin, Lanlivery	St. Austell
	Danalite	Wheal Clinton, Mylor	Carnmenellis
Not known, but by analogy, almost certainly from a lode in metamorphosed greenstone	Danalite (B.M. No. 39955)	'Redruth'	Probably Carn Brea
	Danalite (B.M. No. 74451)	'Redruth' (almost certainly from the same locality as the preceding specimen)	do.

The associations of helvine, genthelvite, and danalite in Cornwall and Devon.

As the occurrences of these minerals described above show, the environments and associations are distinct from those of any other beryllium minerals occurring in the south-west. In contrast to the rare occurrences of beryl and other species in pegmatites and early greisen-bordered lodes in granite, and of phenakite and bertrandite in high-temperature, usually tin-bearing, lodes both in granite and in killas, where the assemblages are entirely different, the helvine-group minerals all occur in calcareous rocks, either impure limestones or greenstones. In all cases, these rocks have been metamorphosed and metasomatized by the adjacent granite, and carry skarn-type minerals such as idocrase,

wollastonite, diopsidic pyroxenes, garnet (lime- and iron-bearing varieties, often with some manganese) and axinite, as well as scheelite, fluorite, calcite, chlorite, &c. Helvine and genthelvite are present in essentially pyrometasomatic deposits of hydrothermal origin, all except one in impure limestones, and are accompanied by sulphides such as löllingite, arsenopyrite, pyrrhotine, pyrite, chalcopyrite, molybdenite in one instance, blende, and galena. Danalite occurs in veins or lodes of hydrothermal origin where these cut or are associated with greenstones and in almost every case is accompanied by arsenopyrite, pyrite, chalcopyrite, blende, fluorite, calcite, and chlorite.

The occurrence of danalite in veins in greenstone and of helvine in the impure limestones reflects the ratios of the available Fe and Mn, the greenstones being in general rich in Fe (with the exception of Wheal Cock, St. Just, where a local, somewhat greater concentration of Mn was apparently available), the impure limestones being demonstrably richer in Mn. The rarity of genthelvite, both in Cornwall and elsewhere, is no doubt due to rocks with a high content of Zn being exceptional; the introduction of Zn generally takes place at a relatively late stage, as does the formation of blende, and to this the occurrence at Treburland conforms. It is clear that a concentration of Zn was introduced and was available for the formation of genthelvite, but the local deficiency in Mn in the impure limestones and the availability of Fe in the closely associated intruded greenstones are reflected in the low Mn-content and the relatively high Fe-content.

It appears to be significant that both the greenstones and the impure limestones in which the helvine-group minerals occur in Cornwall and Devon lie in close proximity to the granite and have been thermally and metasomatically altered; before, and probably during, the introduction of the beryllium-bearing solutions, whatever their original alumina content, the whole or the greater part of the available Al had been or was immobilized or 'fixed' in the formation of the skarn-type calcium silicates. While calcium, as such, may not necessarily have been essential for the formation of the helvine-group minerals, it had the effect of removing or neutralizing the alumina both in the permeating solutions and in the host-rock, thus giving rise to conditions of Al-deficiency, which were not congenial to the formation of beryl or other aluminous beryllium minerals, but more congenial to the formation of helvine-group minerals, depending on the other elements available. The sub-aluminous conditions produced in thermally metamorphosed and metasomatized limestones, consequent on the formation of skarn-type

calcium-silicates, no doubt accounts for the virtual absence of beryl and other beryllium minerals in these rocks, in contrast to their presence in metamorphic aluminous schists. Beryl has been recorded in limestones, but very rarely, as in the classic occurrences in Colombia, where its formation has been attributed to pegmatitic or other hydrothermal solutions introduced under 'pneumatolytic' conditions; in Colombia the limestones were not thermally metamorphosed and no skarn silicates were formed, but albite was deposited, the solutions also giving rise to the calcite infilling in the veins, and the general conditions in which the beryl was deposited were aluminous, and not influenced, as in metamorphosed limestones, by the host-rock.

It has frequently been noted that conditions in granite cusps and bosses are more strongly influenced by high concentrations of various elements than elsewhere in a batholith. This is certainly the case in the granites of Cornwall and Devon, where the conditions and mineralization in general are exceedingly complex. This complexity is largely due to the many phases of mineralization that took place, apart from the fact, established by a number of recent investigations, that almost all the granite intrusions or bosses themselves are composite and comprise two and usually three distinct phases. Mineralization accompanied and succeeded many of these phases, some more than others, and while, in general, the main stages of hydrothermal lode formation followed the latest phase, there is evidence to show that earlier deposition followed earlier phases.

The granites of Cornwall and Devon are rich in beryllium, as has been shown in five cases investigated by J. R. Butler.[1] Though records of beryllium minerals in the south-west have up till now been somewhat restricted, recent investigations have indicated a wider and more varied distribution than hitherto suggested. With other volatiles, beryllium tends to migrate into pockets and structural traps towards the upper and outer margins of the intrusions and to be deposited, early, in pegmatites. Beryl, under these conditions, is relatively rare in Cornwall and Devon, though there are a number of the normally much rarer occurrences in early, mainly greisen-bordered, lodes. J. Phemister,[2] in 1940, drew attention to the apparent ease with which, under the complex conditions prevailing in Cornwall, beryl could be altered and transformed, and though this may, in part, explain the apparent rarity of beryl, the recorded and many recently confirmed occurrences of

[1] J. R. Butler, Geochimica Acta, 1953, vol. 4, p. 157.
[2] J. Phemister, Min. Mag., 1940, vol. 25, p. 575.

beryllium minerals, in both Cornwall and Devon, indicate that much of the beryllium has been introduced at a relatively late stage. This introduction is not confined to any one phase in the emplacement of a composite intrusion and may result in a variety of minerals being deposited in a variety of associations. In the case of the St. Austell granite intrusion, the eastern, phase 1, portion shows beryl (rare) in pegmatites (with herderite and bertrandite), phenakite as a late-formed mineral in pegmatites, and just outside the northern margin, danalite in veins in metamorphosed greenstone at Tretoil and Wheal Maudlin, and helvine in metamorphosed impure limestones at Wheal Betsy (Tremore) and at Bodmin Wheal Mary. In the central, second phase, beryl occurs in greisen-bordered veins with cassiterite, wolframite, &c. in granite, and phenakite as a late mineral in pegmatite in killas just outside the granite; in the more westerly, 'china-stone' area, the third and last phase, beryl also occurs in a greisen-bordered lode with cassiterite and löllingite. These occurrences illustrate clearly the variation in the minerals formed and their associations: comparable occurrences and associations occur at the many other localities.

In a preliminary account of the helvine at Iron Mountain, J. J. Glass[1] had suggested that beryllium-bearing minerals such as helvine might be limited to those parts of contact-metamorphic deposits that were of hydrothermal origin. In 1953 W. T. Holser[2] described an unusual association of beryl and helvine at the Victorio Mountains, New Mexico, the beryl occurring in a tungsten-bearing quartz-muscovite vein against a limestone, the helvine in metamorphic marble and tactite within the same limestone. After discussing the paragenesis and conditions for their formation, Holser suggested that the beryl and helvine could have been formed from solutions originally of identical Al-rich composition, but while in the fissure-vein the chemical conditions of the wall-rock would have had little effect, permeation of the solutions into limestone would have changed the composition of the whole system, excess aluminium being removed to form grossular and idocrase, causing the formation of helvine.

The pattern in Cornwall and Devon clearly follows that demonstrated by Glass *et al.* and by Holser.

[1] J. J. Glass, Trans. Amer. Geophys. Union, 1943, p. 253.

[2] W. T. Holser, Amer. Min. 1953, vol. 38, p. 599, where many references are given.

Twenty-second list of new mineral names.

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[Taken as read 2 November 1961.]

THIS list continues the series of 21 published triennially by Dr. L. J. Spencer between 1897 and 1958. Such lists evidently meet a generally-felt need, as they now appear in the American Mineralogist, the Bulletin de la Société française de Minéralogie et de Cristallographie, and the Записки Всесоюзного Минералогического Общества; the continuation of Dr. Spencer's series seems desirable since it differs from the others in several respects.

The present list includes 474 names: of these 38 are errors (including mistransliterations; only those errors that are dangerously near another accepted name, or are consistently used by their author, or whose original may not easily be recognized, have been included); 58 are other spelling variants (including French and German transliterations of Russian names, particularly where these are likely to be indexed differently from the English transliteration); 41 are synonyms, new names proposed for minerals already named; 28 are names for mixtures or for groups rather than for individual species; and 36 were probably not intended by their authors as new names, but simply as descriptive terms (e.g. Bleiarsenapatit for mimetite), but as these terms have exactly the same form as other mineral names, such as barium-phosphuranylite, they must be regarded as new names. Of the remaining 273 names, 63 are of minerals so inadequately characterized or of such uncertain individuality that a species name is premature, and 68 are superfluous names for varieties or for end-members of an isomorphous series (e.g. alumogoethite for an aluminian goethite). There remain 142 acceptable names, less than a third of the total;[1] and of these 34 are names for artificial products not known to occur naturally.

[1] Compare M. Fleischer, Amer. Min., 1961, vol. 46, p. 463.

Ajoite. W. T. Schaller and A. C. Vlisidis, 1958. Amer. Min., vol. 43, p. 1107. Bluish-green laths, plates, or massive, from Ajo, Pima Co., Arizona, near $Cu_6Al_2Si_{10}O_{29}.5\frac{1}{2}H_2O$. Named from the locality. [M.A. **14**–198.]

Al-nontronite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 311 (Al-Nontronit). Unnecessary name for aluminian nontronite.

Aluminiocopiapit, variant of or error for Aluminocopiapit (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 211).

Aluminium-saponite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 313 (Aluminium-Saponit). Unnecessary name for aluminian saponite.

Aluminium-sepiolite. L. E. R. Rogers, J. P. Quirke, and K. Norrish, 1956. Journ. Soil Sci., vol. 7, p. 177. Unnecessary name for aluminian sepiolite.

Aluminium spinel. N. E. Filonenko, I. V. Lavrov, O. V. Andreeva, and R. L. Pevzner, 1957. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 115, p. 583 (Глиноземистой шпинел). Octahedral crystals obtained in the manufacture of synthetic corundum are stated to give chemical analyses corresponding to Al_3O_4. [M.A. **13**-648.]

Alumocobaltomelane. I. I. Ginzburg and I. A. Rukavishnikova, 1951. Мин. древн. выветривания Урала (Minerals of the ancient zone of weathering of the Urals), Moscow, 1951, p. 128 (алюмокобальтомелан). The names alumocobaltomelane, cobaltomelane, cobaltonickelemelane, cryptonickelemelane, nickel-cobaltomelane, and nickelemelane are given to a variety of admitted mixtures of manganese and other oxides. 'The names are . . . merely mineralogical waste baskets' (M. Fleischer, Amer. Min., 1961, vol. 46, p. 767).

Alumogoethite. S. I. Beneslavsky, 1957. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 113, p. 1130 (Алюмогетит). Aluminian goethite, occurring in bauxites. An unnecessary name.

Alumohematite. S. I. Beneslavsky, 1957. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 113, p. 1130 (Алюмогематит). K. F. Chudoba, Hintze, Handb. Min., 1959, Erg.-Bd. II, p. 655 (Alumohaematit). An aluminian hematite in bauxites. An unnecessary name.

Alvanite. E. A. Ankinovich, 1959. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 88, p. 157 (Альванит). Light blue-green rosettes, monoclinic, near $Al_3VO_4(OH)_6.2\frac{1}{2}H_2O$, in the argillaceous anthraxolitic vanadiferous deposits of Kurumsak and Balasanskandyk, Karatau, Kazakhstan. Named from the composition, *al*uminium *va*na*d*ate. [M.A. **14**–280.] An anion has probably been overlooked, as the mineral is stated to give off acid water when heated.

Ammonium-aphthitalite. K. F. Chudoba, 1959. Hintze, Handb. Min., Erg.-Bd. II, p. 658 (Ammonium-Aphthitalit). An unnecessary name for the ammonian aphthitalite of Frondel. [M.A. **11**–302.]

Ammonium boltwoodite, sodium boltwoodite. R. M. Honea, 1961. Amer. Min., vol. 46, p. 12. The ammonium and sodium analogues of boltwoodite, $K_2(UO_2)_2(SiO_3)_2(OH)_2.5H_2O$; the term potassium boltwoodite is applied to boltwoodite itself.

Ammonium gastunite, *see* Gastunite (of Honea).

Ammonium-glaserite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 195 (Ammonium-Glaserit). Syn. of Ammonium-aphthitalite, q.v.

Angelellite. P. Ramdohr, F. Ahlfeld, and F. Berndt, 1959. Neues Jahrb. Min., Monatsh., p. 145 (Angelellit); see also K. Weber, ibid., p. 152. Dark brown anorthic crystals in the fissures of a fumarole on Cerro Pululus, north-west Argentina, appear to be $Fe_4As_2O_{11}$. Named after Dr. V. Angelelli, Director of the Geol. Survey of Argentina. [M.A. **14**–343.]

Aquacrepit, *error for* Aquacreptit (Hintze, Handb. Min., Erg.-Bd. II, p. 659).

Arizonite. H. G. Hanks, before 1878. [Hinton, Handbook to Arizona, 1878], quoted in A. L. Flagg, Mineralogical journeys in Arizona (Scottsdale, Arizona), 1958, p. 23. Name for 'a type of ore, discovered in Yavapai county . . . on a claim known at the time as the Sumner'. A mixture: 'The principal vein matter is micaceous iron, iodide of silver, gold, sulphurets of iron and antimony.' Not the Arizonite of C. Palmer, 1909 (5th List).

Arschinowit, *see* Arshinovite.

Arsenatapatit. F. Machatschki, 1953. Spez. Min., Wien, p. 330. Syn. of Svabite.

Arsenatbelowit, German transliteration of Арсенат-беловит (arsenate-belovite, 21st List) (Hintze, Handb. Min., 1959, Erg.-Bd. II, p. 660).

Arsenothorite. E. M. Bonshtedt-Kupletskaya, 1961. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 90, p. 108 (Арсеноторит, arsenothorite). Translation of the Chinese name Shen-t'u-shih (Shentulite, q.v.).

Arsen-stibiconite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 146 (Arsen-Stibiconit). Syn. of Arsenstibite.

Arsen-struvite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 243

(Arsen-Struvit). $NH_4MgAsO_4.6H_2O$, the artificial arsenic analogue of struvite.

Arsensulvanit, *error for* Arsenosulvanit (20th List) (Hintze, Handb. Min., Erg.-Bd. II, p. 660).

Arsenuranocircite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 253 (Arsen-Uranocircit). Name proposed by Strunz for the arsenic analogue of uranocircite, then unknown in nature. L. N. Belova, 2nd U.N. Internat. Conf. Peaceful Uses Atomic Energy, 1958, vol. 2, p. 294, proposed the same name for a natural barium uranyl arsenate from a pitchblende-molybdenum deposit (locality not stated), but this mineral belongs to the meta- series: 'it should have been called meta-arsenuranocircite' (M. Fleischer, Amer. Min., 1959, vol. 44, p. 466). [M.A. **14**–199, 344.] Synonym of Heinrichite (q.v.); it is not clear which name has priority as applied to a natural mineral.

Arsenuranylite. L. N. Belova, 1958. Зап. Всесоюз. Мин. Общ. (Trans. All-Union Min. Soc.), vol. 87, p. 598 (Арсенуранилит). The arsenate analogue of phosphuranylite, which it closely resembles except for a deeper orange colour. Formula $Ca(UO_2)_4(AsO_4)_2(OH)_4.6H_2O$. Locality not stated. Named from the composition and in analogy with phosphuranylite. [M.A. **14**–282, 344.]

Arshinovite. E. G. Razumnaya, G. A. Smelyanskaya, K. G. Korolev, and G. V. Pokulnis, 1957. [Мет. иссл. мин. сырья (Methods of study of raw materials), Gosgeoltekhizdat, p. 45]; abstr. in Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1958, vol. 87, p. 486 (аршиновит, arshinovite); Hintze, Handb. Min., Erg.-Bd. II, 1959, p. 660 (Arschinowit). Yet another name for a partially metamict zircon. [M.A. **14**–277, 345; Amer. Min. **44**–210.]

Avicennite. Kh. N. Karpova, E. A. Konkova, E. D. Larkin, and V. F. Saveliev, 1958. [Доклады Акад. Наук Узб. ССР (Compt. Rend. Acad. Sci. Uzbek SSR), no. 2, p. 23]; abstr. in Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1959, vol. 88, p. 319 (Авиценнит, Avicennite). Minute black crystals; cubic, essentially Tl_2O_3; provisional formula $7Tl_2O_3.Fe_2O_3$, with a 9·12 Å and $z = 4$ [but artificial Tl_2O_3 has only 16 Tl_2O_3 per unit cell]. From Dzhuzumli, Mt. Zirabulaksk region, Bukhara. Named after the alchemist Avicenna (Abu Ali Ibn Sina), who lived in Bukhara, Tadzhikistan. [M.A. **14**-278.]

Bafertisite. Peng Ch'i-Jui, 1959. [Ti-chih K'o-hseuh, vol. 10, p. 289]; abstr. in Amer. Min., 1960, vol. 45, p. 754. Also in [Sci. Record (Pekin), vol. 3, p. 652]; abstr. in Amer. Min., 1960, vol. 45, p. 1317, and in Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 90, p. 105

(Бафертисит). $BaFe_2TiSi_2O_9$, in orthorhombic crystals distinct from taramellite. Named from the composition, Ba–Fe(r)–Ti–Si.

Baikovite. A. V. Rudneva, 1958. [Акад. Наук СССР, Инст. Геол. Руд. Месторожд. Петрог., Мин., Геохим., Инст. Хим. Силикат, 1958, p. 285]; abstr. in Amer. Min., 1959, vol. 44, p. 907; Hintze, Handb. Min., 1960, Erg.-Bd. II, p. 925 (Baikowit). The artificial spinel $MgTi_2O_4$. Named after A. A. Baikov. [M.A. **15**–45.]

Baotite. Peng Ch'i-Jui, 1959. [Ti-chih K'o-hsueh, vol. 10, p. 289]; abstr. in Amer. Min., 1960, vol. 45, p. 750 (Pao-t'ou-k'uang). V. I. Simonov, Кристаллография, 1960, vol. 5, p. 542 (Баотит), with reference to E. I. Semenov and Huan Wen-Sin, Ti-chih K'o-hsueh, vol. 10. E. I. Semenov, Huan Wen-Sin, and T. A. Kapitinova, Доклады Акад. Наук СССР, 1961, vol. 136, p. 915 (Баотит; p. 758, baotite). Silicate of Ba, Ti, and Nb, with chloride; tetragonal. Found at Paotow (Баотоу), Inner Mongolia; named from the locality.

Barium carbonate-apatite. Samad Mohseni-Koutchesfehani and Gerard Montel, 1961. Compt. Rend. Acad. Sci. Paris, vol. 252, p. 1161 (carbonate-apatite barytique). Synthetic $Ba_{10}(PO_4)_6CO_3$, obtained by the action of CO_2 on barium hydroxy-apatite.

Barium-lamprophyllite. O. B. Dudkin, 1959. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 88, p. 713 (Бариевый лампрофиллит); ibid., 1961, vol. 90, p. 111 (barium-lamprophyllite). An unnecessary name for barian lamprophyllite.

Barium-phosphuranylite. V. Ross, 1956. Amer. Min., vol. 41, p. 818. Artificial $Ba(UO_2)_4(PO_4)_2(OH)_4.8H_2O$, the barium analogue of phosphuranylite. Named from the composition. *See also* Bergenite.

Barium uranophane. L. N. Belova, 1958. Proc. 2nd U.N. Conf. Peaceful Uses Atomic Energy, vol. 2, p. 295. A silicate of Ba and U; X-ray data resemble those of cuprosklodowskite. [M.A. **14**–344.] Relation to uranophane uncertain and description incomplete; 'needs further study' (M. Fleischer, Amer. Min., 1959, vol. 44, p. 466). Cf. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 109 (Бариевый уранофан, barium uranophane).

Barnesite. Malcolm Ross, 1959. Amer. Min., vol. 44, p. 322. The unnamed sodium analogue of hewettite described by A. D. Weeks and M. E. Thompson (U.S.G.S. Bull. 1009-B, 1954, p. 57); named for W. H. Barnes. Much 'metahewettite' is barnesite.

Batisite. S. M. Kravchenko and E. V. Vlasova, 1959. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 128, p. 1046 (Батисит); ibid., 1960, vol. 133, p. 657. $Na_2BaTi_2(Si_2O_7)_2$, dark brown

orthorhombic crystals from the Inaglina pegmatite, Central Aldan. Isostructural with shcherbakovite, but contains no Nb. Named from the composition, Ba–Ti–Si.

Behierite. J. Behier, 1960. [Rep. Malgache, Rapport Annual Serv. Géol., p. 181]; abstr. in Amer. Min., 1961, vol. 46, p. 767. Two small crystals from Manjaka, Madagascar, are thought, on X-ray data, to be $TaBO_4$. Named after M. Jean Behier of the Serv. géol., Madagascar. A premature name.

Bergenite. H. W. Bültemann and G. H. Moh, 1959. Neues Jahrb. Min., Monatsh., p. 232 (Bergenit). Synonym of barium-phosphuranylite (q.v.); occurs naturally at Bergen an der Trieb, Saxony, with other uranium minerals; named from the locality, the older name being rejected as implying a barian phosphuranylite rather than the barium analogue.

Beryllosodalite. E. I. Semenov and A. V. Bykova, 1960. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 133, p. 1191 (Бериллосодалит). Abstr. Bull. Soc. franç. Min. Crist., 1961, vol. 84, p. 205 (Berillosodalite). Sodalite with partial replacement of Al_2 by BeSi, near $Na_4BeAlSi_4O_{12}Cl$, from the Lovozero massif, Kola peninsula. What is evidently the same mineral is also described, unnamed, from Ilimaussaq, Greenland, by H. Sørensen, Rept. 21st session Internat. Geol. Congr., Norden, 1960, part 17, p. 31; tetragonal.

Bilibinite. E. Z. Buryanova, 1958. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 87, p. 667 (Билибинит). A black amorphous hydrated silicate of uranium, lead, lanthanons, &c., near nenadkevite. Locality not given. Named after Ya. A. Bilibin. [M.A. **14**–280.] There are too many names for ill-defined amorphous uranium silicates already.

Birunite. S. T. Badalov and I. M. Golovanov, 1957. [Доклады Акад. Наук Узбек ССР (Compt. Rend. Acad. Sci. Uzbek SSR), no. 12, p. 17]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1959, vol. 88, p. 320 (Бирунит, Birunite). Silicate, carbonate, and sulphate of calcium, occurring with but distinct from thaumasite, from the Almylyk orefield, Uzbekistan. Named after the medieval Uzbek alchemist Abu-r-Raikhana Al-Biruni. [M.A. **14**–279.]

Bismuthmicrolite. N. E. Zalashkova, 1957. Труды Инст. Мин. Геохим. Крист. Редк. Элем. (Trans. Inst. Min. Geochem. Cryst. Rare Elements), no. 1, p. 77 (Висмутомикролит). Abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1958, vol. 87, p. 479 (Висмутомикролит, bismuthmicrolite); Amer. Min., 1958, vol. 43, p. 1223; Bull. Soc. franç. Min. Crist., 1959, vol. 82, p. 90 (bismuthomicrolite); Hintze, Handb. Min., Erg.-Bd. II, 1960, p. 926 (Bismutomikrolith). A bismuthian

microlite (3% Bi_2O_3) from the Altai Mts. [M.A. **14**–276.] An unnecessary name.

Bleiantimonspießglanze. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 86, 109. A group name, including fülöppite, zinckenite, robinsonite, plagionite, heteromorphite, jamesonite, parajamesonite, semseyite, boulangerite, meneghinite, and sakharovaite (bismuth-jamesonite).

Bleiapatit. F. Machatschki, 1953. Spez. Min., Wien, p. 330. Syn. of Pyromorphite.

Bleiarsenapatit. F. Machatschki, 1953. Spez. Min., Wien, p. 330. Syn. of Mimetite.

Bleiarsenspießglanze. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 86, 108. A group name, including sartorite, baumhauerite, liveingite, rathite, dufrenoysite, lengenbachite, jordanite, geocronite, and gratonite.

Bleikupferspießglanze. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 86, 106. A group name, including seligmannite, bournonite, aikinite, hammarite, lindströmite, gladite, rézbányite, and wittite.

Bleiromeit. F. Machatschki, 1953. Spez. Min., Wien, p. 328. Syn. of Monimolite.

Bleisilberspießglanze. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp 86, 107. A group name, including hutchinsonite, fizélyite, ramdohrite, andorite, freieslebenite, diaphorite, owyheeite, schirmerite, and benjaminite.

Bleispießglanze. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 86, 108. A group name, subdivided into Bleiarsenspießglanze, Bleiantimonspießglanze, and Bleiwismutspießglanze (qq.v.).

Bleivanadatapatit. F. Machatschki, 1953. Spez. Min., Wien, p. 330. Syn. of Vanadinite.

Bleiwismutspießglanze. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 86, 111. A group name, including ustarasite, galenobismutite, cannizzarite, cosalite, kobellite, weibullite, bursaite, [and bonchevite].

Blixite. O. Gabrielson, A. Parwell, and F. E. Wickman, 1958. Arkiv Min. Geol., vol. 2, p. 411 (Blixit). A basic lead chloride, $Pb_4Cl_2O_3$ or $Pb_{16}Cl_8(O,OH)_{16-x}$ with x about 2·6, occurring as a fissure mineral at Långban, Sweden. Named after Dr. Ragnar Blix. [M.A. **14**–416.]

Bobkowit. German transliteration of Бобковит, bobkovite (21st List). (Hintze, Handb. Min., 1959, Erg.-Bd. II, p. 670.)

Böggildit. Variant of Bøggildite (20th List). (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 234.)

Böhmite. A more correct form of Boehmite (11th List), named by J. de Lapparent (1927) in honour of Dr. Johann Böhm of Berlin; corrected in Neues Jahrb. Min., 1928, Abt. A, Ref. I, p. 84 (Böhmit). The correct form has been fairly widely used in Germany (Hintze, Handb. Min., Erg.-Bd., p. 86; H. Strunz, Min. Tabellen, 2nd and 3rd edns; F. Machatschki, Spez. Min., Wien; &c.), but hardly ever in Britain or America; it is perhaps not too late to correct this spelling.

Bruyerite. G. Tacnet, 1956. [Soc. Hist. Nat. Creusot, vol. 14, no. 4]: abstr. Amer. Min., 1958, vol. 43, p. 624. Also [Feder. franç. Soc. Sci. Nat., no. 5, p. 121], abstr. Bull. Soc. franç. Min. Crist., 1958, vol. 81, p. 154. Black concretionary material, mainly calcite, from Queue de Bruyère, Breuil reservoir, Le Creusot, France. Named from the locality. An unnecessary name.

Buryktalskite. I. I. Ginzburg, 1960. Кора выветривания (Crust of weathering), vol. 3, p. 56 (Бурыктальскит). The X-ray patterns of the mixtures called nickelemelane, cobaltomelane, &c. (qq.v.), include lines of goethite, cryptomelane, and elizavetinskite (q.v.); Ginzburg subtracts these and defines buryktalskite by the pattern with lines at 4·88 (10), 4·66 (10), 4·61 (10), 1·482 (10), 9·17 (7), 3·09 (7), 1·834 (7), 1·689 (7). Named from its occurrence in the ores of Buryktal (Бурыктал). 'Many of the lines attributed to "buryktalskite" can be assigned to strong lines of pyrolusite, lithiophorite, or cryptomelane; others cannot be assigned with any confidence' (M. Fleischer, Amer. Min., 1961, vol. 46, p. 767). Inadequately defined and very doubtful; the name ought not to have been given.

Cadmium-dolomite. J. R. Goldsmith, 1958. Bull. Geol. Soc. Amer., vol. 69, p. 1570. A name for $CdMg(CO_3)_2$, the cadmium analogue of dolomite; obtained synthetically.

Cadmoselite. A better transliteration of Кадмоселит, Kadmoselite, since the name was given for the composition, *Cadm*ium *sel*enide (21st List). (Min. Mag. **31**–963, correction **31**–viiib; M.A. **14**–59; Bull. Soc. franç. Min. Crist., 1958, vol. 81, p. 238; Amer. Min., 1958, vol. 43, p. 623.)

Cafetite. A. A. Kukharenko, V. V. Kondratieva, and V. M. Kovyazina, 1959. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 88, p. 444 (Кафетит). Orthorhombic radiating crystals in a pyroxenite from Africanda, Kola peninsula; approximately $(Ca,Mg)(Fe,Al)_2Ti_4O_{12}.4H_2O$. Named from the composition, Ca–Fe–Ti. [M.A. **14**–501.]

Ca-hureaulite. A. Volborth, 1954. Geologi, Helsinki, vol. 2, no. 2, p. 5 (Ca-hureauliitti). $CaMn_5(PO_4)_4.4H_2O$, from Eräjärvi, Finland. Hureaulite is $H_2Mn_5(PO_4)_4.4H_2O$, and no evidence is adduced that the material is really a variety of or related to hureaulite.

Ca-Illite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 308 (Ca-Illit).

Calcio-chondrodite. E. R. Buckle and H. F. W. Taylor, 1958. Amer. Min., vol. 43, p. 818. $Ca_5(SiO_4)_2(OH)_2$, the calcium analogue of chondrodite; synthetic.

Calcio-jarosite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 197 (Calcio-Jarosit). Syn. of Calcium jarosite (19th List).

Calciotalc. D. P. Serdyuchenko, 1959. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 88, p. 298 (Кальциотальк). Abstr. Hintze, Handb. Min., Erg.-Bd. II, 1960, p. 926 (Calciotalk, Kalciotalk, Kalziotalk). A variety containing 13% CaO, occurring with normal talc replacing actinolite in the phlogopite deposit of the Medviezhy river, Aldan region, Yakutia. Named from the composition. [M.A. **14**–280.] N. V. Belov considers that the mineral is really a brittle mica, $CaMg_2Si_4O_{10}(OH)_2$, and would be better named Magnesium margarite (q.v.). [M.A. **14**–280.]

Calciumhilgardite-3Tc, Calciumhilgardite-2M(Cc). O. Braitsch, 1959. Beitr. Min. Petr., vol. 6, p. 233 (3Tc-Calciumhilgardit; 2M(Cc)-Calciumhilgardit). Systematic names for the anorthic polymorph parahilgardite and the monoclinic polymorph hilgardite. M. Fleischer (Amer. Min., 1959, vol. 44, p. 1102) points out that the letters and numbers serving to distinguish polymorphic structures should always be written as suffixes, not as prefixes (cf. wurtzite, the micas, and SiC).

Calciumuranospinite. M. E. Mrose, 1953. Amer. Min., vol. 38, p. 1159. Syn. of Uranospinite.

Calcium-urcilite (error), **Calcium-ursilite,** *see* Ursilite.

Calzirtite. T. B. Zdorik, G. A. Sidorenko, and A. V. Bykova, 1961. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 137, p. 681 (Кальциртит, calzirtite). $CaZr_3TiO_9$, tetragonal; from the East Siberian massif. Named from the composition, *cal*cium-*zir*conium-*ti*tanium.

Canasite. M. D. Dorfman, D. L. Rogachev, Z. I. Goroshchenko, and E. I. Uspenskaya, 1959. Труды Мин. Муз. Акад. Наук СССР (Trans. Min. Mus. Acad. Sci. USSR), vol. 9, p. 158 (Канасит). Silicate and fluoride of calcium and sodium, monoclinic; occurs associated with fenaksite (q.v.) at Khibina, Kola peninsula. Named from the composition, Ca–Na–Si. [M.A. **14**–414; Amer. Min. **45**–253.] May be the Mineral 6 of Dorfman (Amer. Min. **44**–910).

Carbocernaite. A. G. Bulakh, V. V. Kondratyeva, and E. N. Baranova, 1961. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 90, p. 42 (Карбоцернаит). A carbonate of Ca, Sr, Na, and lanthanons (mainly La and Ce), $(Na,Ca,Sr,Ln)CO_3$; orthorhombic. From Vuori-Yarvi, Kola peninsula. Named from the composition, *carbon-ce*rium-*na*trium. The name is uncomfortably near carbocer.

Cäsiumbiotit, variant of Caesium biotite (13th List). (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 305.)

Cefluosil. A. B. Rudneva and T. Ya. Malysheva, 1961. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 136, p. 191 (Цефтосил; p. 7, cephtosyl). Silicate and fluoride of cerium earths and Ca, from a slag. Named from the composition церий-фтор-силикат (*ce*rium-*fluor*-*sil*icate).

Celanite. A. B. Rudneva and T. Ya. Malysheva, 1961. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 136, p. 191 (Целанит; p. 7, coelanite). Oxide of Ti, Al, and lanthanons, cubic, isolated from a slag. Named from the principal rare earths present, церия (ceria), лантана (lanthana), and неодима (neodymia). Composition, X-ray data, and origin agree exactly with ceraltite (this list), which has priority. The name is easily confused with ceylonite (Цейлонит).

Ceraltite. V. V. Lapin, H. H. Kyrtseva, and D. N. Knyazeva, 1960. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 134, p. 1195 (Цералтит). Oxide of Ti, Al, and lanthanons, with a perovskite structure, isolated from slags. Named from the composition, Ce(r)–Al–Ti.

Cephtosyl. Erroneous transliteration of Цефтосил, cefluosil, q.v.

Cererdensilikatapatit. F. Machatschki, 1953. Spez. Min., Wien, p. 330. Syn. of Britholite (2nd List).

Cererdenthoriumeuxenit. F. Machatschki, 1953. Spez. Min., Wien, p. 319. Syn. of Aeschynite.

Chalcokyanite. H. Strunz, 1961. Amer. Min., vol. 46, p. 758. Variant of chalcocyanite; synonym of hydrocyanite. The substitution of kyan- for cyan- in those mineral names where it represents Greek *κυανός*, to avoid the mispronunciation sian-, is too late by a century or more, in view of the innumerable chemical names involving the radical CN. Moreover, chalcokyanite suggests a variety of kyanite.

Chalcopentlandite. H. Pauly, 1958. Medd. Grønland, vol. 157, no. 2, p. 32. An assumed high-temperature phase, now represented by aggregates of pentlandite and chalcopyrite (about 10% of the latter),

which are believed to be the product of exsolution. From a nickeliferous pyrrhotine deposit at Igdlukúnguaq, Greenland. Named from the composition.

Chalkocyanit. Germanized version of Chalcocyanite (19th List). (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 193.)

Chalkonatrit, Chalkonatronit. Erroneous and corrected Germanized variants of Chalconatronite (21st List). (Hintze, Handb. Min., Erg.-Bd. II, p. 682; H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 179.)

Chavesite. J. Murdoch, 1958. Amer. Min., vol. 43, p. 1148. An anorthic hydrated calcium manganese phosphate (not analysed quantitatively for lack of sufficient material) occurring in the Boqueirao pegmatite, Borborema, Paraíba, Brazil; characterized by optical and X-ray data; perhaps isostructural with monetite. [M.A. **14**–199.] Named after Dr. Onofre Chaves of Brazil.

Chrombiotit. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 304 (Chrombiotit). Hypothetical chromian biotite; an unnecessary name.

Chrommuscovit. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 304 (Chrommuskovit). Syn. of Fuchsite.

Chrome-pyrophyllite. H. Meixner, 1961. Chemie der Erde, vol. 21, p. 1 (Chrom-Pyrophyllit). Unnecessary name for a green chromian pyrophyllite (3% Cr_2O_3) from Mühlbach, Salzburg.

Chudobaite. H. Strunz, 1960. Neues Jahrb. Min., Monatsh., p. 1 (Chudobait). $(Na,K)(Mg,Zn)_2H(AsO_4)_2.4H_2O$, in anorthic crystals from the second oxidation zone at Tsumeb, South-West Africa. Named after Prof. K. F. Chudoba. [M.A. **14**–500.]

Chukhrovite. L. P. Ermilova, V. A. Moleva, and R. F. Klevtsova, 1960. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 89, p. 15 (Чухровит). A cubic mineral occurring in the Kara-Oba molybdenum deposit, Central Kazakhstan, approximates to $Ca_6Al_3(Y,Ln)_2(SO_4)_2F_{23}.20H_2O$. Named after Dr. F. Kh. Chukhrov. Perhaps the same as an unnamed cubic mineral from Greenland described by O. B. Bøggild (Zeits. Kryst. Min., 1913, vol. 51, p. 608).

Clino-anthophyllite. W. Layton and R. Phillips, 1960. Min. Mag., vol. 32, p. 659. The doubtful, synthetic, monoclinic polymorph of anthophyllite; distinct from cummingtonite, to which calcium is essential.

Cobalt chrysotile. W. Noll, H. Kircher, and W. Sybertz, 1958. Naturwiss., vol. 45, p. 489 (Kobaltchrysotil). Beitr. Min. Petr., 1960,

vol. 7, p. 232. An artificial product, $Co_3Si_2O_5(OH)_4$, isostructural with chrysotile.

Cobaltomelane, Cobalto-nickelemelane. I. I. Ginzburg and I. A. Rukavishnikova, 1951 (кобальтомелан, кобальто-никелемелан). *See* Alumocobaltomelane (this List).

Cobalt pentlandite. O. Kuovo, M. Huhma, and Y. Vuorelainen, 1959. Amer. Min., vol. 44, p. 897. The cobalt analogue of pentlandite, Co_9S_8, from Northern Karelia.

Coelanite. Erroneous transliteration of Целанит, celanite, q.v.

Columbotantalite. L. Van Wambeke, 1958. Bull. Soc. belge Géol., vol. 67, p. 383 (colombotantalite). A non-committal term for members of the columbite–tantalite series.

Copper vermiculite. W. A. Bassett, 1958. Amer. Min., vol. 43, p. 1112. Vermiculite from the Roan Antelope mine, Northern Rhodesia, contains up to 7% Cu replacing Mg; similar material with up to 10% Cu has been obtained artificially. An unnecessary name for cuprian vermiculite.

Cousinite. J. F. Vaes, 1958. [Geol. en Mijnbouw, vol. 20, p. 449 (Cousiniet)]; abstr. Amer. Min., 1959, vol. 44, p. 910. An inadequately described molybdate of uranium or of uranium and magnesium. Compare Moluranite (21st List), Umohoite (20th List).

Cryptonickelemelane. K. K. Nikitin, 1960. Кора выветривания (Crust of weathering), vol. 3, p. 42 (криптоникелемелан). *See* Alumocobaltomelane (this List).

Cuprobismuthit, variant of Cuprobismutite (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 104).

Custerite. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1958, vol. 87, p. 76; Bull. Soc. franç. Min. Crist., 1958, vol. 81, p. 154. Improper transliteration of Кёстерит (Kësterite or Kyosterite). Not to be confused with Custerite of Umpleby, Schaller, and Larsen (7th List).

D'Ansite. H. Autenreith and G. Braune, 1958. Naturwiss., vol. 45, p. 362 (D'Ansit). See also H. Strunz, Neues Jahrb. Min., Monatsh., 1958, p. 152. A name for the cubic artificial product $MgSO_4.3NaCl.9Na_2SO_4$, near to but distinct from hanksite. Named after Prof. J. D'Ans. [M.A. **14**–283.]

Delatorreite. F. S. Simons and J. A. Straczek, 1958. U.S. Geol. Surv. Bull. no. 1057, p. 1. Synonym of Todorokite (14th List). (Amer. Min., 1960, vol. 45, p. 1175.)

Delhayelite. Th. G. Sahama and Kai Hytönen, 1959. Min. Mag., vol. 32, p. 6. Orthorhombic laths in a melilite-nephelinite lava from Mt. Shaheru, Kivu, Congo; near $(Na,K)_4Ca_5Al_6Si_{32}O_{80}.18H_2O.3(Na_2,K_2)(Cl_2,F_2,SO_4)$. Named after F. Delhaye, a Belgian geologist and a pioneer in the exploration of North Kivu.

Delrioite. M. E. Thompson and A. M. Sherwood, 1959. Amer. Min., vol. 44, p. 261. $CaSrV_2O_7.3H_2O$, as a microcrystalline efflorescence on sandstone on a dump of the Jo Dandy mine, Montrose Co., Colorado. Named after A. M. del Rio, who first discovered vanadium (erythronium) in North America. [M.A. **14**–282.]

Dixeyite. V. Marmo, 1959. Schweiz. Min. Petr. Mitt., vol. 39, p. 125 (Dixeyit). Isotropic grains in an amphibolite from Belihun, Kangeri hills, Sierra Leone, are believed to be a cubic hydrated aluminium silicate, near $Al_2O_3.4–5SiO_2.3–4H_2O$. Named after Dr. F. Dixey.

Djouloukoulite, French transliteration of Джулукулит, dzhulukulite, q.v. (Bull. Soc. franç. Min. Crist., 1958, vol. 81, p. 334).

Dnieprovskite. P. I. Skornyakov, 1944. Reported by M. N. Ionov, [Труды Всесоюз. Магадан. Н.-И. Инст. (Trans. All-Union Magadan Sci. Res. Inst.), 1957, no. 19, p. 9]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1959, vol. 88, p. 311 (Днепровскит, dneprovskite). A wholly unnecessary name given to wood-tin of a radial structure. Named from the Dniepropetrovsk deposit. [M.A. **14**–278.]

α-Duftite, β-Duftite. C. Guillemin, 1956. Bull. Soc. franç. Min. Crist., vol. 70, p. 70. Duftite is divided into two species, α-Duftite, space-group *Pnma* (D_{2h}^{16}), isomorphous with mottramite, and β-Duftite, space-group $P2_12_12_1(D_2^4)$, isomorphous with conichalcite. The material from Cap Garonne, Var, is α-Duftite, while that from Mapimi, Mexico, from Brandy Gill, Cumberland, and from St. Nicholas, Ter-de-Belfort, is β-Duftite. The β-Duftite from Mapimi, studied in detail, contains 3% CaO and has lower refractive indices and density and slightly different cell-dimensions from lime-free α-Duftite from Tsumeb.

Dzhulukulite. N. N. Shishkin, 1958. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 121, p. 724 (Джулукулит). Superfluous name for a nickelian cobaltite from Lake Dzhulu-kul, south-west Tuva; named from the locality. [M.A. **14**–140.]

Eisenchrysotil. F. Machatschki, 1953. Spez. Min., Wien, p. 350. Syn. of Greenalite (4th List).

Eisenenstatit. F. Machatschki, 1953. Spez. Min., Wien, p. 313. Syn. of Hypersthene.

Eisen-magnesium-retgersite. K. F. Chudoba, 1960. Hintze, Handb. Min., Erg.-Bd. II, p. 928 (Eisen-magnesium-retgersit). The ferroan magnesian retgersite of E. N. Eliseev and S. I. Smirnova (Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1958, vol. 87, p. 3).

Eisenwolframit. F. Machatschki, 1953. Spez. Min., Wien, p. 314. Syn. of Ferberite.

Ekanite. B. W. Anderson, G. F. Claringbull, R. J. Davis, and D. K. Hill, 1961. Nature, vol. 190, p. 997. $(Th,U)(Ca,Fe,Pb)_2Si_8O_{20}$; metamict, recrystallizing on heating to a tetragonal phase. From Eheliyagoda, Raknapura district, Ceylon. Named after the discoverer, Mr. F. L. D. Ekanayake.

Elizavetinskite. V. I. Mikheev, 1957. [Рентгометрический оредрелитель минералов (X-ray determinative tables for minerals), Госгеолтехиздат, Moscow, p. 409 (елизаветинскит)]; abstr. Amer. Min., 1961, vol. 46, p. 767. A black powdery material in clay from the Elizavetinsk deposit, Sverdlovsk; the X-ray pattern is near that of lithiophorite, but the composition is assumed to be (Mn,Co)OOH. 'The name has no standing. Every strong line of the X-ray pattern corresponds closely to the published data for lithiophorite, a mineral known to contain appreciable amounts of cobalt and nickel' (M. Fleischer, Amer. Min., 1961, vol. 46, p. 767).

Ellweilerite. H. W. Bultemann, 1960. [Der Aufschluss, vol. 11, no. 11, p. 281]; abstr. Amer. Min., 1961, vol. 46, p. 465. Thin tabular crystals with zeunerite from Bühlskopf, Ellweiler, Birkenfeld, Germany, contain Na, U, and As, and appear to be identical with Sodium uranospinite (19th List); named from the locality. The name Sodium uranospinite has priority.

Emeraldite, error for Smaragdite ((Доклады Акад. Наук СССР [Compt. Rend. Acad. Sci. URSS], 1960, vol. 130, p. 485).

Eskolaite. O. Kouvo and Y. Vuorelainen, 1958. Amer. Min., vol. 43, p. 1098. Chromium oxide, Cr_2O_3, isomorphous with hematite, from Outokumpu, Finland. Named after Prof. Pentti Eskola. [M.A. **14**–198.] Essentially identical with Merumite (18th List), which has priority, but merumite was imperfectly described and was believed to be hydrated; the name eskolaite is to be preferred.

Fauserite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 202. An hypothetical orthorhombic polymorph of $MnSO_4.7H_2O$; not to be confused with Fauserite of Breithaupt (1865), which appears to have been a manganoan epsomite (Min. Mag. **22**–511).

Fauyasit. Error for Faujasit (F. Machatschki, Spez. Min., Wien, pp. 345, 362).

Fenaksite. M. D. Dorfman, D. L. Rogachev, Z. I. Goroshchenko, and A. V. Mokretsova, 1959. Труды Мин. Муз. Акад. Наук СССР (Trans. Min. Mus. Acad. Sci. USSR), vol. 9, p. 152 (Фенаксит). A pale rose monoclinic silicate of ferrous iron and alkalis from a pegmatite associated with an ijolite–urtite intrusion at Khibina, Kola peninsula. Named from the composition, Fe–Na–K–Si. [M.A. **14**–414.] May be identical with the Mineral 5 of Dorfman (Amer. Min. **44**–910). The name is easily confused with phenakite.

Fenghuanglite. Peng Ch'i-Jui, 1959. [Ti-chih K'o-hsueh, vol. 10, p. 289]; abstr. Amer. Min., 1960, vol. 45, p. 754 (feng-huang-shih); Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 108 (Фынченит [fȳnchenit], feng-huang-shih). Unnecessary name for a thorian britholite.

Ferri-berthierine. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 323 (Ferri-Berthierin). An oxidized product obtained by heating berthierine (= ferro-berthierine) to 400° C. in air. The ferric chamosite of G. W. Brindley and R. F. Youell (Min. Mag. **30**–57).

Ferrichlorite. L. O. Stankevich, 1957. Минер. Сборник Львовск. Геол. Общ. (Min. Mag. Lvov Geol. Soc.), no. 11, p. 159 (Феррихлорит). A group name. [M.A. **14**–141.] Internationalized form of Eisenchlorit (of Holzner, 1938).

Ferri-hidalgoite. K. F. Chudoba, 1959. Hintze, Handb. Min., Erg.-Bd. II, p. 702 (Ferri-Hidalgoit). An unnecessary name for the ferrian hidalgoite of R. L. Smith, F. S. Simons, and A. C. Vlisidis (1953).

Ferri-metahalloysite. Yu. F. Pekun, 1956, according to H. Strunz (Min. Tabellen, 3rd edn, 1957, p. 325). An unnecessary name for ferrian metahalloysite.

Ferripalygorskite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 328 (Ferripalygorskit). Internationalized form of Eisenpalygorskit (Koechlin).

Ferriphengite. K. Kanehira and S. Banno, 1960. Journ. Min. Soc. Japan, vol. 66, p. 654. A variety of muscovite from the Iimori district, Japan, near $K_2(Mg,Fe)Fe^{'''}Al_3Si_7O_{20}(OH)_4$.

Ferri-phlogopite. M. Sambonsugi, 1958. Journ. Min. Soc. Japan, vol. 3, pp. 634 (Japanese), 801 (English summary). A brown mica from Teshirogi district, Fukushima prefecture, having 15% Fe_2O_3 and very little FeO. [M.A. **14**–343.]

Ferrisaponite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 313 (Ferri-Saponit). A group name to include griffithite and lembergite (of Sudo).

Ferrisepiolite. H. Strunz, 1956. Fortschr. Min., vol. 34, p. 48 (Ferrisepiolith). Group name to include gunnbjarnite and xylotile.

Ferri-sericite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 372 (Ferri-Sericit). Internationalized form of Iron-sericite (20th List).

Ferriserpentines, mistaken translation of Железистые серпентины, ferruginous serpentines (Доклады Акад. Наук СССР [Compt. Rend. Acad. Sci. URSS], 1960, vol. 130, p. 1325).

Ferro-berthierine. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 323 (Ferro-Berthierin). Syn. of Berthierine. The ferrous chamosite of G. W. Brindley and R. F. Youell (Min. Mag. **30**–57).

Ferro-friedelite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 327 (Ferro-Friedelit). To replace the name Ferroschallerite (12th List), as this mineral is regarded as a variety of friedelite and not of schallerite (cf. M.A. **13**–125).

Ferroglaucophane. A. Miyachiro, 1957. Journ. Fac. Sci. Univ. Tokyo, sect. 2. vol. 11, p. 57. A name for the clino-amphibole end-member $Na_2Fe^{\cdot\cdot}_3Al_2Si_8O_{22}(OH)_2$.

Ferrohexahydrite. J. Kubisz, 1958. Bull. Acad. Polon. Sci., Sér. sci. chim., géol., géogr., vol. 6, p. 459. A name for the hypothetical monoclinic end-member $FeSO_4.6H_2O$.

Ferro-johannsenite. K. F. Chudoba, 1959. Hintze, Handb. Min., Erg.-Bd. II, p. 705 (Ferro-Johannsenit). An unnecessary name for the ferroan johannsenite of V. T. Allen and J. J. Fahey (1953).

Ferroniobite. K. F. Chudoba, 1959. Hintze, Handb. Min., Erg.-Bd. II, p. 705 (Ferroniobit). Syn. of Ferrocolumbite (of Simpson).

Ferropargasite. J. F. G. Wilkinson, 1961. Amer. Min., vol. 46, p. 341. This name is preferred to hastingsite for the clino-amphibole end-member $NaCa_2(Fe_4Al)(Si_6Al_2)O_{22}(OH)_2$, 'inasmuch as the term hastingsite for many years has referred to Fe-rich amphiboles with small amounts of MgO, or else to various calciferous amphiboles with variable FeO/MgO ratios' [hastingsite has also been used for the end-member $NaCa_2Fe^{\cdot\cdot}_4Fe^{\cdot\cdot\cdot}Al_2Si_6O_{22}(OH)_2$ (M.A. **10**–70)]. There are already too many names for particular 'end-members' of the clino-amphibole series.

Ferrophlogopite. V. A. Frank-Kamenetsky, 1958. Referred to by R. C. Mackenzie, Clay Min. Bull., 1959, vol. 4, p. 61. Undefined; presumably a variety of biotite.

Ferrospinel. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 137 (Ferrospinell). Syn. of Hercynite (of Zippe).

Ferrozincrhodochrosite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 173 (Ferrozinkrhodochrosit). Syn. of Capillitite (19th List).

Fe-spodumene. S. Šćavničar and G. Sabatier, 1957. Bull. Soc. franç. Min. Crist, vol. 80, p. 308 (spodumène-Fe); M.A. **13**–636 (Fe-spodumene). The synthetic compound $LiFeSi_2O_6$, the iron analogue of spodumene.

Fleischerite. C. Frondel and H. Strunz, 1960. Neues Jahrb. Min., Monatsh., p. 132; Amer. Min., 1957, vol. 42, p. 747. $Pb_3Ge^{\cdot\cdot}(SO_4)_2(OH)_4 \cdot 4H_2O$, hexagonal, from Tsumeb, South-West Africa. Not to be confused with the fleischerite of G. Gagarin and J. R. Cuomo (19th List), which is an unacceptable name for 6*H* polymorph of wurtzite. Named after Dr. Michael Fleischer of the U.S. Geol. Survey. [M.A. **15**–43.]

Fouchéit, error for Foucherit (Hintze, Handb. Min., Erg.-Bd. II, pp. 544, 707).

Freudenbergite. G. Frenzel, 1961. Neues Jahrb. Min., Monatsh., p. 12 (Freudenbergit). $Na_2Fe_2Ti_7O_{18}$, hexagonal, black crystals in the syenite of Katzenbuckel, Odenwald, Germany. Named after Prof. Wilhelm Freudenberg, author of a monograph on the Katzenbuckel rocks. [M.A. **15**–135.]

Frolowit, German transliteration of Фроловит, frolovite (Hintze, Hand. Min., Erg.-Bd. II, p. 708).

Froodite. J. E. Hawley and L. G. Berry, 1958. Canad. Min., vol. 6, p. 200. A monoclinic palladium bismuthide, identical with artificial α-$PdBi_2$, from the Frood mine, Sudbury, Ontario. Named from the locality. [M.A. **14**–343.]

Fynchenite, standard English transliteration of the Russian transliteration of Fenghuanglite (q.v.).

Gallite. H. Strunz, B. H. Geier, and E. Seeliger, 1958. Neues Jahrb. Min., Monatsh., p. 241 (Gallit). Grains and inclusions in germanite, renierite, blende, and other ore minerals from Tsumeb, South-West Africa, contain Cu, Ga, and S, and are identical with artificial $CuGaS_2$; tetragonal, related to chalcopyrite. Also from the Kipushi mine, Katanga. The name refers to its being the first mineral with gallium as an essential constituent. [M.A. **14**–279.] It is the Mineral O of H. Strunz, G. Söhnge, and B. H. Geier, Neues Jahrb. Min., Monatsh., 1958, p. 85.

Garronite. G. P. L. Walker, 1960. Min. Mag., vol. 32, p. 505. Tentative name for a zeolite related to phillipsite, occurring in the basalts of the Garron plateau, Co. Antrim. Named from the locality.

Gastunite. R. M. Honea, 1959. Amer. Min., vol. 44, p. 1047. The names Gastunite 1, Gastunite 1a, Gastunite 1b were given by H. Haberlandt and A. Schiener (1951) to three imperfectly characterized uranium minerals (cf. 20th List); gastunite 1b proves to be β-uranotile, while gastunite 1a has since been described under the name of Haiweeite (q.v.); gastunite 1 appears to be a lower hydrate of haiweeite, but is not identical with the dehydrated haiweeite named Meta-haiweeite (q.v.) (K. Walenta, Neues Jahrb. Min., Monatsh., 1960, p. 37). Unfortunately, R. M. Honea has described another mineral, distinct from any of the three named by Haberlandt and Schiener, under the name of gastunite; this fourth 'gastunite' proves to be identical with Weeksite (this List) (M. Fleischer, priv. comm.; E. Fejer, priv. comm.). In view of the prior uses of gastunite the name weeksite is to be preferred. Honea also describes artificial analogues, Ammonium-, Hydronium-, Potassium-, and Sodium-gastunites.

Gel-anatase. E. I. Semenov, 1957. Труды Инст. Мин., Геохим., Крист., Редк. Элем. (Trans. Inst. Min. Geochem. Cryst. Rare Elements), no. 1, p. 41 (Гельанатаз). Finely divided anatase, a component of leucoxene pseudomorphs after ilmenite in the Lovozero massif, Kola peninsula. An unnecessary name. [M.A. **14**–278.]

Gel-bertrandite. E. I. Semenov, 1957. Труды Инст. Мин., Геохим., Крист., Редк. Элем. (Trans. Inst. Min. Geochem. Cryst. Rare Elements), no. 1, p. 64 (Гельбертрандит). A glassy, apparently colloidal mineral (no X-ray data), with the composition of bertrandite plus extra water, from pegmatites in the Khibina and Lovozero tundras, Kola peninsula. [M.A. **14**–277.] Inadequately characterized.

Gel-rutile. E. I. Semenov, 1957. Труды Инст. Мин., Геохим., Крист., Редк. Элем. (Trans. Inst. Min. Geochem. Cryst. Rare Elements), no. 1, p. 41 (Гельрутил). Finely divided rutile, a component of leucoxene pseudomorphs after ilmenite in the Lovozero massif, Kola peninsula. [M.A. **14**–278.] An unnecessary name.

Gerasimovskite. E. I. Semenov, 1957. Труды Инст. Мин., Геохим., Крист., Редк. Элем. (Trans. Inst. Min. Geochem. Cryst. Rare Elements), no. 1, p. 41 (Герасимовскит). The niobium analogue of belyankinite (19th List), occurring in an ussingite pegmatite from the Lovozero massif, Kola peninsula. Named after V. I. Gerasimovsky. [M.A. **14**–278.]

Germanate-analcime, -celsian, -leucite, -natrolite, -nepheline, -sodalite. H. Strunz and E. Ritter, 1961. Neues Jahrb. Min., Monatsh.,

Abt. A, p. 22 (Germanat-Analcim, &c.). Artificial germanium analogues of the silicate minerals.

Geversite. E. F. Stumpfl, 1961. Min. Mag., vol. 32, p. 833. $PtSb_2$, cubic with pyrite-type structure, intergrown with native platinum at the Dreikop mine, Transvaal, South Africa. Named after T. W. Gevers.

Ghaussoulith, error for Ghassoulith (Hintze, Handb. Min., Erg.-Bd. II, p. 930).

Giulekhite, variant of Gyulekhite (Amer. Min., 1958, vol. 43, p. 1222).

Gowerite. R. C. Erd, J. F. McAlister, and H. Almond, 1959. Amer. Min., vol. 44, p. 911. $CaB_6O_{10}.5H_2O$, monoclinic, from Furnace Creek, Death Valley, California. Named after Harrison P. Gower. [M.A. **15**–501.]

Greenolith, error for Greenalith (F. Machatschki, Spez. Min., 1953, pp. 350, 362).

Grönlandit. M. H. Klaproth, 1809. Tasch. Min., vol. 3, p. 198. A. Breithaupt, 1858. Berg. Hütt. Zeitung, vol. 17, p. 61. Original form of Greenlandite (of Klaproth, = almandine) and of Greenlandite (of Breithaupt, = columbite).

Gutsevichite. E. A. Ankinovich, 1959. [Сб. Науч. Тр. Казахск. Горнометалл. Инст., 1959, no. 18, Геология, p. 125]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 104 (Гуцевичит, gutsevichite). Phosphate and vanadate of Al, Fe, &c.; formulated $(Al,Fe)_3\{(P,V)O_4\}_2(OH)_3.7\frac{1}{2}$–$8\frac{1}{2}H_2O$, but this overlooks some 10% of MgO, CaO, BaO, SO_3, and SiO_2. Named for V. P. Gutsevich.

Haggite, error for Häggite (Bull. Soc. franç. Min. Crist., 1961, vol. 84, p. 209).

Haiweeite. T. C. McBurney and J. Murdoch, 1959. Amer. Min., vol. 44, p. 839. $CaU_2^{iv}Si_6O_{17}.5H_2O$, pale yellow, probably monoclinic, from above the Haiwee reservoir, Coso Mtns., California. Named from the locality. [M.A. **14**–415.] Appears to be identical with gastunite 1a (20th List), but though the latter name has priority the description was inadequate and the name haiweeite is preferred (K. Walenta, Neues Jahrb. Min., Monatsh., 1960, p. 37). *See* Gastunite (this List).

Hanuschit, Germanized form of Hanušite (Hintze, Handb. Min., Erg.-Bd. II, p. 142).

Hasingtonit, error for Haringtonit (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 378).

Heinrichite. E. B. Gross, A. S. Corey, R. S. Mitchell, and K. Walenta, 1958. Amer. Min., vol. 43, p. 1134. The arsenic analogue of uranocircite, $Ba(UO_2)_2(AsO_4)_2.10$–$12H_2O$ and its dehydration product with $8H_2O$

(metaheinrichite, q.v.) occur near Lakeview, Oregon, and in the Black Forest, Germany. Named after Prof. E. William Heinrich. [M.A. **14**–199.] *See also* Arsenuranocircite.

Hellyerite. K. L. Williams, 1958. [Australian Inst. Min. Met., Stilwell Anniv. vol., p. 263]; abstr. Amer. Min., 1959, vol. 44, pp. 533 and 1103. Normal nickel carbonate, $NiCO_3.6H_2O$, occurring with zaratite at the Lord Brassey nickel mine, Heazlewood, Tasmania. Named after Henry Hellyer, surveyor and explorer. [M.A. **14**–414.]

Hexabolite. H. Strunz, 1949. Min. Tabellen, 2nd edn, p. 206. Syn. of basaltic hornblende.

Högbohmit, error for Högbomit (Hintze, Handb. Min., Erg.-Bd. II, p. 893).

Hormites. R. H. S. Robertson, 1959, in R. C. Mackenzie, Clay Min. Bull., vol. 4, p. 64. An unnecessary group-name for the sepiolite–palygorskite family.

Horobetsuite. K. Hayase, 1955. Min. Journ. (Japan), vol. 1, p. 189. $(Bi,Sb)_2S_3$, intermediate between stibnite and bismuthinite, with 30 to 70 mol. % Bi_2S_3. Occurs at the Horobetsu mine, Hokkaido, Japan. Named from the locality. 'Nom inutile' (Bull. Soc. franç. Min. Crist., 1959, vol. 82, p. 91).

Hovaxite, erroneous transliteration of Ховахсит, khovakhsite (Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1959, vol. 88, p. 317).

Hsianghualite. Wen-Hui Huang, Shao-Hua Tu, K'ung-Hai Wang, Chun-Lin Chao, and Cheng-Chih Yu, 1958. [Ti-chih-yueh-k'an, vol. 7, p. 35]; abstr. Amer. Min., 1959, vol. 44, p. 1327 (hsiang-hua-shih); Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 105 (Сянхуанит, hsiang-hua-shih). $Ca_3Be_3Li_2Si_2O_{10}F_2$; cubic, occurring with taaffeite in metamorphosed limestone in Hunan. See also A. A. Beus, [Акад. Наук СССР, Инст. Мин., Геохим., Крист., Редк. Элем., 1960, p. 60], abstr. Amer. Min., 1961, vol. 46, p. 244 (hsianghualite).

Hydroamesite. J. Erdélyi, V. Koblencz, and N. S. Varga, 1959. [Acta Geol. Acad. Sci. Hung., vol. 6, p. 95]; abstr. Amer. Min., 1959, vol. 44, p. 1328, and Bull. Soc. franç. Min. Crist., 1960, vol. 83, p. 149. An unnecessary name for a porcellaneous mineral identified as amesite with some excess H_2O^+.

Hydroantigorite. J. Erdélyi, V. Koblencz, and N. S. Varga, 1959. [Acta Geol. Acad. Sci. Hung., vol. 6, p. 65]; abstr. Amer. Min., 1959, vol. 44, p. 1328. An unnecessary name for an antigorite with a small excess of H_2O^+.

Hydro-cassiterite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 151 (Hydro-Cassiterit). A name for varlamoffite and souxite.

Hydrocerite. K. A. Vlasov, M. V. Kuzmenko, and E. M. Eskova, 1959. [The Lovozero Alkaline Massif (Moscow, Acad. Sci. USSR), p. 427]; abstr. Amer. Min., 1960, vol. 45, p. 1132. Amorphous, pseudomorphous after manganosteenstrupine (q.v.) in the pegmatite of Mt. Karnasurt, Lovozero massif, Kola peninsula, are formulated (Ln,Th,Ca)(Al,Fe,Ti,Nb)$(Si,P)_2O_7.5H_2O$. The composition is very near that of karnasurtite (q.v.). Not to be confused with the hydrocerite of Glocker (1831, = lanthanite) or of Glocker (1847, = bastnäsite).

Hydrolepidolite. V. A. Frank-Kamenetsky, 1960. Clay Min. Bull., vol. 4, pp. 162, 170. Name for a group of clay minerals; incompletely defined.

Hydronium gastunite, see Gastunite (of Honea).

Hydronium jarosite. J. Kubisz, 1960. Bull. Acad. Polon. Sci., Sér. géol. géogr., vol. 8, p. 95. A mineral of the jarosite family from Staszic mine, Holy Cross Mt., Poland, contains only 0·21 (Na,K) to 3 Fe; the author considers the name carphosiderite inappropriate since A. A. Moss has shown (Min. Mag. **31**–407) that the original carphosiderite and many occurrences subsequently described as carphosiderite are in fact jarosite or natrojarosite. On the other hand, the name carphosiderite is widely accepted for the artificial material.

Hydroparagonite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 307. An unnecessary new name for Brammallite (16th List), cf. M. Fleischer, Amer. Min., 1958, vol. 43, p. 1222, and 1959, vol. 44, p. 1329.

Hydropolylithionite. E. I. Semenov, 1959. Труды Мин. Муз. Акад. Наук СССР (Trans. Min. Mus. Acad. Sci. USSR), vol. 9, p. 107 (Гидрополилитионит). A brownish-white massive variety of the lepidolite 'polylithionite', high in water. An unnecessary name.

Hydroscarbroite. W. J. Duffin and J. Goodyear, 1960. Min. Mag., vol. 32, p. 357. A more highly hydrated phase than scarbroite, $Al_2(CO_3)_3.12Al(OH)_3$, occurring along with scarbroite at South Bay, Scarborough, and dehydrating irreversibly on exposure to air.

Hydroserpentine. V. A. Frank-Kamenetsky, 1960. Clay Min. Bull., vol. 4, pp. 162, 168. $Mg_6Si_4O_{10}(OH)_8.nH_2O$; a 'swelling serpentine'.

Hydrosodalite. K. A. Vlasov, M. V. Kuzmenko, and E. M. Eskova, 1959. [The Lovozero Alkaline Massif. (Moscow, Acad. Sci. USSR), p. 272]; abstr. Amer. Min., 1960, vol. 45, p. 1131. See also V. I. Gerasimovsky, A. I. Polyakov, and L. P. Voronina, Доклады Акад. Наук СССР (Compt.

Rend. Acad. Sci. URSS), 1960, vol. 131, p. 402. A constituent of the syenites of the Lovozero massif, Kola peninsula, is variously formulated $Na_{10}Al_6Si_6(O,OH)_{25}(O,Cl)_2$ and $2NaAlSiO_4.H_2O$. Perhaps a variety of sodalite with Cl′ partially or wholly replaced by OH′; its relation to lembergite (of Lagorio; 1st List) and to the hydrosodalite of Wyart and Michel-Lévy (19th List), an artificial product containing OH′ and CO_3'' in place of Cl′, remains uncertain.

Idaite. G. Frenzel, 1959. Neues Jahrb. Min., Monatsh., p. 142 (Idait). A sulphide mineral, Cu_5FeS_6, hexagonal and related to covelline, occurring with bornite at the Ida mine, Khan, South-West Africa; named from the locality. [M.A. **14**–279.] Perhaps a ferroan covelline, E. N. Eliseev, Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1960, vol. 89, p. 128; cf. G. Frenzel, ibid., p. 490, and Schweiz. Min. Petr. Mitt., 1960, vol. 40, p. 243.

Igdloite. M. Dano and H. Sørensen, 1959. Medd. Grønland, vol. 162, no. 5, p. 27; see also A. Safiannikoff, Bull. Acad. Roy. Sci. d'Outre-mer (Bruxelles), 1959, new ser., vol. 5, p. 1253. An imperfectly described mineral of perovskite type from Igdlúnguaq, Greenland, formed during the alteration of eudialyte; spectroscopic analysis shows major amounts of Ti, Nb, Na, Ca, and Al. Perhaps essentially $NaNbO_3$, but with some SiO_2, differing in this and in its mode of formation from Lueshite (this List). The differences seem hardly adequate to justify separate names.

Ikunolite. A. Kato, 1959. Min. Journ. (Japan), vol. 2, p. 397. $Bi_4(S,Se)_3$, with S:Se near 12, rhombohedral, from the Ikuno mine, Hyôgo prefecture, Japan; very similar to josëite but contains no Te. Named from the locality. [M.A. **15**–43.] Cf. Laitakarite (this List).

Imanite. A. V. Rudneva, 1958. [Акад. Наук СССР, Инст. Геол. Руд. Месторожд., Петрог., Мин., Геохим., Инст. Хим. Силикат., p. 285]; abstr. Amer. Min., 1959, vol. 44, p. 907. The artificial cubic compound $Ca_3Ti_2Si_3O_{12}$. Named from the initials of Inst. Metallurg., Akad. Nauk. [M.A. **15**–45.]

Innelite. S. M. Kravchenko, 1960. Quoted in Yu. A. Balashov and N. V. Turanskaya, [Геохимия (Geokhimya), 1960, no. 7, p. 618]; abstr. Amer. Min., 1961, vol. 46, p. 769. Mention is made of a new barium silicate from a pegmatite from the Inagli massif, Aldan, containing about 40% BaO, to be described by Kravchenko. Status doubtful pending full description.

Isostannin, variant of Isostannite (21st List) (H. Strunz, Min. Tabellen, 3rd edn, p. 95).

Itoite. C. Frondel and H. Strunz, 1960. Neues Jahrb. Min., Monatsh., p. 132 (Itoit). $Pb_3[GeO_2(OH)_2](SO_4)_2$, orthorhombic and isostructural

with anglesite. From Tsumeb, South-West Africa. Named after Prof. Tei-ichi Ito of Tokyo. [M.A. **15**–43.]

Jiningite. Cheng-Chi Kuo, 1959. [Kexue Tongbao (Scientia), 1959, no. 6, p. 206]; abstr. Amer. Min., 1960, vol. 45, p. 755 (jiningite); Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc., 1961, vol. 90, p. 108 (Жинингит, jiningite)). A variety of thorite or thorogummite with 6% P_2O_5, 1% V_2O_5, 7% CaO, 17% Fe_2O_3, found in a muscovite-granite from Inner Mongolia. An unnecessary name.

Julukulite, erroneous transliteration of Джулукулит, dzhulukulite, q.v. (Зап. Всесоюз. Мин. Общ. [Mem. All-Union Min. Soc.], 1959, vol. 88, p. 309).

Junkerite, variant of Junckerite (T. Thomson, Outlines Min., 1836, vol. 1, p. 448).

Kalciotalk, Kalziotalk, variant transliterations of Кальциотальк, calciotalc, q.v. (Hintze, Handb. Min., Erg.-Bd. II, p. 926).

Kaliumstruvit. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 243. The artificial compound $KMgPO_4.6H_2O$, analogous to struvite.

Kalknatronplagioklas. F. Machatschki, 1953. Spez. Min., Wien, p. 321. Syn. of Andesine.

Kanasite, erroneous transliteration of Канасит, canasite (q.v.).

Kaolin-Chamosit. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 323. Syn. of Berthierine.

Karnasurtite. M. V. Kuzmenko and S. I. Kozhanov, 1959. [Труды Инст. Мин., Геохим., Крист., Редк. Элем. (trans. Inst. Min. Geochem. Cryst. Rare Elements), no. 2, p. 95]; abstr. Amer. Min., 1960, vol. 45, p. 1133; Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 107 (Карнасуртит, karnasurtite). A metamict mineral from Mt. Karnasurt, Lovozero massif, Kola peninsula, approximates to $(Ln,Th)(Ti,Nb)(Al,Fe)(Si,P)_2O_7(OH)_4.3H_2O$. Named from the locality. It had previously been named Kozhanovite without a description. The composition is very near that of hydrocerite (of Vlasov *et al.*), q.v.

Karrenbergite. E. Walger, 1958. [Inaug. Diss., Freiburg, p. 52]; abstr. Hintze, Handb. Min., Erg.-Bd. II, 1959, p. 739 (Karrenbergit). A clay mineral intermediate between nontronite and saponite, from Karrenberg, Reichweiler, Pfalz, Germany. Named from the locality.

Karrooite. O. von Knorring and K. G. Cox, 1961. Min. Mag., vol. 32, p. 676. Artificial $MgTi_2O_5$, isomorphous with pseudobrookite. Named from the Karroo volcanic series of Southern Rhodesia, in which there

occurs a mineral Kennedyite (q.v.) containing nearly 50% of this end-member. [M.A. **15**–134.]

Katophorit, variant of Catophorite (H. Strunz, Min. Tabellen, 1957, 3rd edn, p. 295).

Kennedyite. O. von Knorring and K. G. Cox, 1961. Min. Mag., vol. 32, p. 676. $Fe_2MgTi_3O_{10}$, isostructural with pseudobrookite, occurring in the Mateke Hills, Southern Rhodesia. Named after Prof. W. Q. Kennedy of Leeds. [M.A. **15**–134.]

Kesterite, Kêsterite, further variant transliterations of Кёстерит, kësterite (Amer. Min., 1958, vol. 43, p. 1222).

Khovakhsite. N. N. Shishkin and V. A. Mikhailova, 1956. [Сборн. Мат. Тех. Инф. (Collect. Mat. Techn. Inform.), no. 6, Gipronickel, p. 5]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc., 1959), vol. 88, p. 317 (Ховахсит, hovaxite). Imperfectly characterized brown oxidation product of smaltite and safflorite from the Khovakhs deposit, Tuva; named from the locality. [M.A. **14**–278; Amer. Min. **45**–256.] Cf. Yellow earthy cobalt (Dana, Syst. Min., 6th edn, p. 78). A wholly unnecessary name.

Kilchoanite. S. O. Agrell and P. Gay, 1961. Nature, vol. 189, p. 743. $Ca_3Si_2O_7$, a polymorph of rankinite, replacing rankinite at Kilchoan, Ardnamurchan, Scotland. Named from the locality. [M.A. **15**–135.]

Kimzeyite. C. Milton and L. V. Blade, 1958. Science, vol. 127, p. 1343; Amer. Min., 1961, vol. 46, p. 533. A zirconiferous garnet (ZrO_2 20%) from the Kimzey calcite quarry, Magnet Cove, Arkansas. Named after the Kimzey family. [M.A. **15**–43.]

Kivuïte. L. Van Wambeke, 1958. Bull. Soc. belge Géol., vol. 67, p. 383. Proc. 2nd U.N. Internat. Conf. Peaceful Uses Atomic Energy, vol. 3, p. 541. Minute yellow orthorhombic plates, isostructural with phosphuranylite and renardite, associated with phosphuranylite, renardite, cyrtolite, and columbotantalite in a pegmatite from Kobokobo, Kivu, Congo. Probable formula $ThH_2(UO_2)_4(PO_4)_2(OH)_8.7H_2O$. A plumbian variety is also described. [M.A. **14**–281.] Needs confirmation and tests for homogeneity (M. Fleischer, Amer. Min., 1959, vol. 44, p. 1326).

Klinotscheffkinit, variant of Clino-chevkinite (20th List). (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 282.)

Kobaltchrysotil, original spelling of Cobalt chrysotile, q.v.

Kobaltullmannit. F. Machatschki, 1953. Spez. Min., Wien, p. 311. Syn. of Willyamite (1st List).

Kobokobite. J. Thoreau, 1957. Bull. Acad. Roy. Belge, Cl. Sci., ser. 5, vol. 43, p. 705. An intermediate member of the rockbridgeite · frondelite series with $Fe'' \approx Mn$, named from the locality, Kobokobo, Congo. [M.A. **14**–59.] A superfluous name. 'Should not have been named. The formulas of all these minerals are uncertain because of doubt as to the degree of oxidation of FeO' (M. Fleischer, Amer. Min., 1958, vol. 43, p. 795).

Koiwinit, German transliteration of Койвинит, koivinite (20th List). (Hintze, Handb. Min., Erg.-Bd. II, p. 569.)

Kosterite, Kösterite. Further variant transliterations of Кёстерит, kësterite. (Amer. Min., 1958, vol. 43, p. 1222; Hintze, Handb. Min., Erg.-Bd. II, pp. 743, 932.)

Koutekite. Z. Johan, 1958. Nature, vol. 181, p. 1553; Chemie der Erde, 1960, vol. 20, p. 217. Arsenide of copper, near Cu_2As. Distinct from β-Domeykite. Hexagonal, occurring intergrown with an unnamed copper arsenide at Černy Důl, Krkonoše, Bohemia; also obtained artificially. Named after Prof. J. Koutek of Prague. [M.A. **14**–279.]

Kozhanovite. L. L. Shilin, 1956. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 107, p. 739 (Кожановит). Provisional name for an undescribed mineral later named Karnasurtite (q.v.).

Kratochwilit, Germanized variant of Kratochvílite (14th List). (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 347.)

Kremenchugite. M. N. Dobrokhotov, 1957. Минер. Сборник Львовского Геол. Общ. (Min. Mag. Lvov Geol. Soc.), no. 11, p. 295 (Кременчугит). A highly pleochroic chlorite, apparently a thuringite, from the Kremenchug region, Ukraine. Named from the locality. [M.A. **14**–141.] A superfluous name.

Krementschugite. Erratic French transliteration of Кременчугит, kremenchugite (Bull. Soc. franç. Min. Crist., 1958, vol. 81, p. 335).

Kryshanowskit, variant of Kryschanowskit (Kryzhanovskite, 19th List). (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 246.)

Kupfer-Saponit, syn. of Medmontite (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 313).

Kupferspießglanze. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 86, 104. Group name, including chalcostibite, emplectite, cuprobismutite, and wittichenite.

Laitakarite. A. Varma, 1959. Geologi, Helsinki, vol. 3, no. 11, p. 11 (Laitakariitti); Bull. Comm. géol. Finlande, 1960, vol. 188, p. 1. Bi_4Se_2S,

rhombohedral and isostructural with josëite. Named after Aarne Laitakari, who collected the material in 1932 at Orijärvi, Finland. [M.A. **14**–139; **15**–134.] Cf. Ikunolite (this List).

Lazarevićite. C. B. Sclar and M. Drovenik, 1960. Bull. Geol. Soc. Amer., vol. 71, p. 1970 (abstract). Microscopic grains of a cubic mineral in copper ore from the Tilva Mika deposit, Bor, Serbia, are identified as Cu_3AsS_4, the arsenic analogue of sulvanite, and named after M. Lazarević, pioneer in the study of the Bor deposits. It would have been better to extend the name Arsenosulvanite (20th List) to include all members of the series $Cu_3(As,V)S_4$ with As > V.

Levyine, Levyite, variants of Levyne (T. Thomson, Outlines Min., 1836, vol. 1, p. 335).

Li-feldspar. S. Šćavnićar and G. Sabatier, 1957. Bull. Soc. franç. Min. Crist., vol. 80, p. 308 (Feldspath-Li). Artificial $LiAlSi_3O_8$; tetragonal. [M.A. **13**–637 (Li-felspar).]

Lilianit, error for Lillianit (Hintze, Handb. Min., Erg.-Bd. II, p. 578).

Lorenzit, error for Lorenzenit (Hintze, Handb. Min., Erg.-Bd. II, p. 579).

Lueshite. A. Safiannikoff, 1959. Bull. Acad. Roy. Sci. d'Outre-mer (Bruxelles), new ser., vol. 5, p. 1251. $NaNbO_3$, cubic, with perovskite structure, occurring with mica at the contact of a carbonatite and a cancrinite-bearing syenite at Lueshe, Goma, Congo. Cf. Igdloite (this List).

Lusungite. L. Van Wambeke, 1958. Bull. Soc. belge Géol., vol. 67, p. 162. A deep-brown coating, associated with limonite, from Kobokobo, Kivu, Congo, contains Fe, Pb, Sr, and P; it is rhombohedral and isostructural with the alunite–beudantite group, and is formulated $(Sr,Pb)Fe_3(PO_4)_2(OH)_5.H_2O$. Named from the river Lusungu, near Kobokobo. [M.A. **14**–282.]

Lybianit, error for Libyanit (Hintze, Handb. Min., Erg.-Bd. II, p. 579).

Magnesiaspat. F. Machatschki, 1953. Spez. Min., Wien, p. 313. Syn. of Magnesite.

Magnesio-arfvedsonite. A. Miyashiro, 1957. Journ. Fac. Sci. Tokyo Univ., sect. 2, vol. 11, p. 57. Also Yu. K. Andreev, 1957. Труды Инст. Геол. Руд., Месторожд., Петрог., Мин., Геохим. (Trans. Inst. Geol. Ore-deposits, Petr., Min., Geochem., vol. 10, p. 12); abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc., 1958, vol. 87, p. 486) (Магнезио-арфведсонит, magnesio-arfvedsonite). The same

name is proposed by Miyashiro for the end-member $Na_2Ca_{\frac{1}{2}}Mg_{3\frac{1}{2}}Fe^{\cdots}_{1\frac{1}{2}}Al_2Si_{7\frac{1}{2}}O_{22}(OH)_2$ of the arfvedsonite series [M.A. **14**–144], and by Andreev for an amphibole near $Na_3Mg_4FeSi_8^{\cdots}O_{22}(OH)_2$ (between arfvedsonite and eckermannite) found in a serpentinite near a granite intrusion. [M.A. **14**–281.]

Magnesiokatophorite. A. Miyashiro, 1957. Journ. Fac. Sci. Tokyo Univ., sect. 2, vol. 11, p. 57. A name for the end-member, $Na_2CaMg_4FeAlSi_7O_{22}(OH)_2$, of the catophorite series. [M.A. **14**–144.]

Magnesioriebeckite. A. Miyashiro, 1957. Journ. Fac. Sci. Tokyo Univ., sect. 2, vol. 11, p. 57; A. Miyashiro and M. Iwasaki, Journ. Geol. Soc. Japan, 1957, vol. 63, p. 698. A name for the end-member, $Na_2Mg_3Fe_2Si_8O_{22}(OH)_2$, of the riebeckite series, or for natural minerals near this. [M.A. **14**–144.] Syn. of Magnesian riebeckite (21st List).

Magnesiospinel. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 137 (Magnesiospinell). Syn. of Spinel.

Magnesium chrysotile. W. Noll, H. Kircher, and W. Sybertz, 1960. Beitr. Min. Petr., vol. 7, p. 232 (Magnesiumchrysotil). Syn. of Chrysotile.

Magnesium-glauconite. H. Urban, 1957. Tonindustrie-Zeitung, vol. 81, p. 363; abstr. Hintze, Handb. Min., Erg.-Bd. II, 1960, p. 835 (Magnesium-Glaukonit). Syn. of Celadonite.

Magnesium-hexahydrite. J. Kubisz, 1958. Bull. Acad. Polon. Sci., Sér. sci. chim., géol., géogr., vol. 6, p. 459. Syn. of Hexahydrite (6th List).

Magnesium-hydromuscovite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 308 (Magnesium-Hydromuskovit). Syn. of Gümbelite.

Magnesium margarite. N. V. Belov, 1959. Зап. Всесоюз Мин. Общ. (Mem. All-Union Min. Soc.), vol. 88, p. 305 (Магниевый маргарит). Proposed as a more appropriate name for the Calciotalc of D. P. Serdyuchenko (q.v.).

Magnesium szomolnokite. J. Kubisz, 1960. Bull. Acad. Polon. Sci., Sér. chim., géol., géogr., vol. 8, p. 101. An unnecessary name for magnesian szomolnokite. Not intended as a synonym of kieserite.

Magnesium urcilite, error for **Magnesium ursilite**; see Ursilite (this List).

Mangan-antigorite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 323 (Mangan-Antigorit). An unnecessary name for manganoan antigorite.

Mangan-belyankinite. E. I. Semenov, 1957. Труды Инст. Мин., Геохим. Крист. Редк. Элем. (Trans. Inst. Min. Geochem. Cryst. Rare Elements), no. 1, p. 41 (Манган-белянкинит). Abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1959, vol. 88, p. 312 (Манган-белянкинит, manganbelyankinite); Amer. Min., 1958, vol. 43, p. 1220 (Mangano-belyankinite). A manganiferous variety of belyankinite (19th List), occurring in brownish-black platy crystals, highly pleochroic, from the Lovozero massif, Kola peninsula. [M.A. **14**–278.] An unnecessary name.

Mangan-chrysotile. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 323 (Mangan-Chrysotil). An unnecessary name for manganoan chrysotile.

Manganogel. H. Strunz, Min. Tabellen, 3rd edn, p. 154. Amorphous MnO_2, present in many occurrences of Wad.

Manganoniobite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 155. Syn. of Manganocolumbite.

Manganoplesite. D. P. Bobrovnik, 1959. Мин. Сборник Львов. Геол. Общ. (Min. Mag. Lvov Geol. Soc.), vol. 13, p. 343 (Манганоплезит). A manganoan chalybite from the Volhynian coal basin; syn. of Oligon spar. An unnecessary name.

Manganosideroplesite. D. P. Bobrovnik, 1959. Мин. Сборник Львов. Геол. Общ. (Min. Mag. Lvov Geol. Soc.), vol. 13, pp. 340, 348 (Мангансидероплезит, manganosideroplesite). A manganoan sideroplesite from the Volhynian coal basin. An unnecessary name.

Manganosteenstrupine. K. A. Vlasov, M. V. Kuzmenko, and E. M. Eskova, 1959. [The Lovozero Alkaline Massif (Moscow, Acad. Sci. USSR), p. 421]; abstr. Amer. Min., 1960, vol. 45, p. 1132. Amorphous (metamict?) material in pegmatites on Mr. Karnasurt, Lovozero massif, Kola peninsula, is formulated $(Ln,Th,Ca)MnSiO_3(OH)_3.2H_2O$ and regarded as a manganese analogue of steenstrupine.

Manganstilpnomelane, variant of Manganostilpnomelane (19th List); syn. of Parsettensite. (Hintze, Handb. Min., Erg.-Bd. II, p. 584.)

β-Manganous sulphide. G. Baron and J. Debyser, 1957. Compt. Rend. Acad. Sci. Paris, vol. 245, p. 1148 (Sulfure manganeux β). Minute black bipyramids in recent sediments from the Baltic Sea were identified by X-ray data as hexagonal β-MnS (Wurtzite group).

Mangan-uralite. S. Kilpady and A. S. Dave, 1958. Journ. Univ. Geol. Soc. Nagpur, vol. 1 (for 1955–6), no. 3, p. 4. A pink amphibole

formed by alteration of blanfordite, from Ponia, Balaghat District, Madhya Pradesh, India. Near magnesio-arfvedsonite with 3% MnO. 'An unnecessary name . . . somewhat inappropriate' (M. Fleischer, Amer. Min., 1959, vol. 44, p. 692).

Matraite. S. Koch, 1958. [Acta Univ. Szegediensis, vol. 11, p. 11]; abstr. Amer. Min., 1960, vol. 45, p. 1131. A mineral occurring at Gyöngyösoroszi with blende and pyrite is identical with the third polymorph of ZnS (γ-ZnS) prepared artificially by Buck and Strock (Amer. Min., 1955, vol. 40, p. 192); this polymorph is termed β'-ZnS by Koch. [M.A. **14**–279.]

Medziankite. Author?, quoted by C. Guillemin, Bull. Soc. franç. Min. Crist., 1956, vol. 79, p. 29. Error for Miedziankite (10th List), a synonym of sandbergerite (of Breithaupt).

Meta-arsenuranocircite, *see* Arsenuranocircite.

Meta-bassetite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 253 (Meta-Bassetit). The lower hydrate of $Fe(UO_2)_2(PO_4)_2$, with $8H_2O$ or less. The name appears to be attributed by Strunz (loc. cit., p. 254) to C. Frondel (Min. Mag., 1954, vol. 30, p. 343), but was not used by Frondel.

Metaceinerite, error for Metazeunerite. (L. N. Belova, Proc. 2nd U.N. Conf. Internat. Uses Atomic Energy, 1958, vol. 2, p. 294; M.A. **14**–344.)

Meta-haiweeite. T. C. McBurney and J. Murdoch, 1959. Amer. Min.. vol. 44, p. 839. K. Walenta, Neues Jahrb. Min., Monatsh., 1960, p. 37. Artificial, produced by dehydration of Haiweeite (q.v.) at 300° C. or higher [M.A. **14**–415]. Walenta considers that the name would more appropriately have been given to the partially hydrated phase formed by dehydration of haiweeite at 100° C., which occurs naturally and was described by Haberlandt and Schiener (1951) as Gastunite 1 (see Gastunite, this List).

Metaheinrichite. E. B. Gross, A. S. Corey, R. S. Mitchell, and K. Walenta, 1958. Amer. Min., vol. 43, p. 1134. K. Walenta, Jahresheft geol. Landesamt Baden-Württemberg, 1958, vol. 3, p. 23. The arsenic analogue of meta-uranocircite, $Ba(UO_2)_2(PO_4)_2.8H_2O$, occurs along with the fully hydrated mineral near Lakeview, Oregon, and in the Schwarzwald, Germany. Named after Prof. E. William Heinrich. [M.A. **14**–199.] L. N. Belova, 1958, gave the name Arsenuranocircite to this lower hydrate; M. Fleischer, Amer. Min., 1959, vol. 44, p. 466, points out that Meta-arsenuranocircite would be more appropriate. It is not clear which name has priority.

Metakahlerite. K. Walenta, 1958. Jahresheft geol. Landesamt Baden-Württemberg, vol. 3, p. 17 (Meta-Kahlerit). $Fe(UO_2)_2(AsO_4)_2.8H_2O$, the lower hydrate of Kahlerite (20th List), found in the Sophia shaft, Baden.

Meta-kirchheimerite. K. Walenta, 1958. Jahresheft geol. Landesamt Baden-Württemberg, vol. 3, p. 34 (Meta-Kirchheimerit). $Co(UO_2)_2(AsO_4)_2.8H_2O$, a member of the meta-torbernite group, from the Sophia shaft, Baden, on pitchblende. Named after Dr. F. Kirchheimer.

Metalaumontite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 342 (Metalaumontit). Syn. of Leonhardite.

Metamontmorillonite. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 310, 325 (Metamontmorillonit). The product of dehydration of montmorillonite at 400° C., with c about 10 Å.

Meta-otenite, error of transliteration for Meta-autunite (Доклады Акад. Наук СССР [Compt. Rend. Acad. Sci. URSS], 1960, vol. 132, p. 493).

Metasandbergerite. K. Walenta, 1958. Techn. Hochschule, Stuttgart; abstr. Bull. Soc. franç. Min. Crist., 1958, vol. 61, p. 68. $Ba(UO_2)_2(PO_4)_2.8H_2O$; later renamed metaheinrichite (q.v.), the name sandbergerite having twice been used before (1866 and 1883).

Metascarbroite. W. J. Duffin and J. Goodyear, 1960. Min. Mag., vol. 32, p. 358. An artificial product obtained by heating scarbroite $[Al_2(CO_3)_3.12Al(OH)_3]$ to between 130° and 230° C.; still contains carbonate.

Metaschoderite. D. M. Hausen, 1960. Bull. Geol. Soc. Amer., vol. 71, p. 1883. $Al_2PO_4VO_4.3H_2O$, a dehydration product of Schoderite (q.v.). [M.A. **15**–44.]

Metaschoepite. C. L. Christ and J. R. Clark, 1960. Amer. Min., vol. 45, p. 1059. Schoepite (= Schoepite–I) is unstable in air, and dehydrates spontaneously to two lower hydrates, Metaschoepite (= Schoepite–II) and Paraschoepite (18th List; also called Schoepite–III).

Meta-uranospinite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 254 (Meta-Uranospinit). The lower hydrate of Uranospinite; occurs naturally at the Sophia shaft, Baden (K. Walenta, Jahresheft geol. Landesamt Baden-Württemberg, 1958, vol. 3, p. 30).

Metavandendriesscheite. C. L. Christ and J. R. Clark, 1960. Amer. Min., vol. 45, p. 1059. Vandendriesscheite (= Vandendriesscheite–I) is unstable in air, and dehydrates spontaneously to a lower hydrate, Metavandendriesscheite (= Vandendriesscheite–II).

Metavermiculite. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 311, 325 (Metavermiculit). The product of dehydration of vermiculite at 400° C., with c about 10 Å.

Metazeolith. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 325. A general name for partially dehydrated zeolites.

Michejewit, German transliteration of Михеевит, mikheevite (Hintze, Handb. Min., Erg.-Bd. II, p. 588).

Michenerite. J. E. Hawley and L. G. Berry, 1958. Canad. Min., vol. 6, p. 200. A palladium bismuthide, cubic with pyrite structure, probably $PdBi_2$, occurring in the ores of the Frood mine, Sudbury, Ontario. Named after C. E. Michener, who discovered the mineral in 1940. [M.A. **14**–343.]

Monalbite. T. R. Schneider and F. Laves, 1957. Zeits. Krist., vol. 109, p. 241 (Monalbit). Since re-examination of the type barbierite shows it to be a microcline, the name monalbite is proposed for the monoclinic modification of $NaAlSi_3O_8$, not yet found in nature.

Mozambikite. J. M. Cotelo Neiva and J. M. Correia Neves, 1960. Internat. Geol. Congr., Rept. 21st session, Norden, pt. 17, p. 53. Yellow-brown octahedra, near $ThSiO_4$ but hydrated; cubic, X-ray pattern unaltered by heating at 1 000° C. From the pegmatites of Alto-Ligonha, Mozambique. Named from the locality.

Nakaséite. Tei-Ichi Ito and H. Muraoka, 1960. Zeits. Krist., vol. 113, p. 93. Near $Pb_4Ag_3Sb_{12}S_{24}$; X-ray powder data are essentially identical with those of andorite, and the mineral is admitted to be 'a structural variety of andorite', but a new name is proposed 'because, apart from the difference in the chemical compositions, it has a very complicated twinned lattice essentially different from that of andorite'. Named from the locality, the Nakasé mine, Japan. A new name should not have been proposed while the status of webnerite and fizelyite remains uncertain. M. Fleischer (Amer. Min., 1960, vol. 45, p. 1314) suggests that the material, which has a c-axis $24 \times 4{\cdot}26$ Å., should be provisionally called andorite–XXIV. [M.A. **15**–44.]

Nasledovite. M. R. Enikeev, 1958. [Доклады Акад. Наук Узбек. ССР (Compt. Rend. Acad. Sci. Uzbek SSR), no. 5, p. 13]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc., 1958, vol. 88, p. 313 (Наследовит, nasledovite). A hydrous carbonate and sulphate of Pb, Mn, Mg, and Al, from the Altyn-Topken mining field, Sardob, Central Asia. Named after B. N. Nasledov. [M.A. **14**–278.]

Natronmanganwollastonit. F. Machatschki, 1953. Spez. Min., Wien, p. 314. Syn. of Schizolite (2nd List).

Natron-mesomicrocline. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 334 (Natron-Mesomikroklin). Syn. of Natronorthoklas.

Natronwollastonit. F. Machatschki, 1953. Spez. Min., Wien, p. 314. Syn. of Pectolite.

Neighborite. E. C. T. Chao, H. T. Evans, jr., B. J. Skinner, and C. Milton, 1961. Amer. Min., vol. 46, p. 379. $NaMgF_3$, orthorhombic and isostructural with perovskite, occurs in dolomitic oil-shale at South Ouray, Uintah Co., Utah, as rounded grains and as octahedral crystals. Named after Mr. Frank Neighbor, District Geologist of the Sun Oil Co.

Nenadkewitschit, German transliteration of Ненадкевичит, nenadkevichite (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 278).

Nichtspießglanze. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 111. A term covering proustite, pyrargyrite, xanthoconite, and pyrostilpnite.

Nickel-antigorite. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 323, 385 (Nickel-Antigorit). An unnecessary name for nickelian antigorite. Karpinskite (21st List) is 'vielleicht ein Nickel-Saponit oder Nickel-Antigorit'.

Nickelbleipyrit. F. Machatschki, 1953. Spez. Min., Wien, p. 306. A sulphide of nickel and lead with some Ag, Cu, and Co, formulated $(Ni,Pb,Ag,Cu,Co)S_2$, is mentioned; its specific gravity is given as 6·01, but no reference, note of origin, or other data are given. Doubtful. Cf. Penroseite (11th List).

Nickelchlorite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 317 (Nickelchlorit). Some of the natural nickel silicates may be members of the chlorite group (cf. M.A. **8**–14).

Nickel-cobaltomelane. K. K. Nikitin, 1960. Кора выветривания (Crust of weathering), vol. 3, p. 41 (Никель-кобальтомелан). *See* Alumocobaltomelane (this List).

Nickeleisenkies. F. Machatschki, 1953. Spez. Min., Wien, p. 310. Syn. of Violarite.

Nickeleisenpyrit. F. Machatschki, 1953. Spez. Min., Wien, p. 306. Syn. of Bravoite.

Nickelemelane. I. I. Ginzburg and I. A. Rukavishnikova, 1951 (никелемелан). *See* Alumocobaltomelane (this List).

Nickelkobaltkies. F. Machatschki, 1953. Spez. Min., Wien, p. 310. Syn. of Siegenite.

Nickel-montmorillonite. K. Kinoshita, N. Tanaka, and T. Honda, 1958. Journ. Min. Soc. Japan, vol. 3, pp. 468, 791. (Nickeliferous montmorillonite, pl. 3 and p. 792; nickel-montmorillonite, p. 792.)

A pale blue mineral previously classed as garnierite, from the Niu mine, Oita prefecture, Japan. [M.A. **14**–281.] Unnecessary name for a nickelian montmorillonite.

Nickelspinel. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 137 (Nickelspinell). A name for artificial $NiAl_2O_4$.

Ningyoite. T. Muto, R. Meyrowitz, A. M. Pommer, and T. Murano, 1959. Amer. Min., vol. 44, p. 633. $CaU(PO_4)_2.1\frac{1}{2}H_2O$, with some replacement of Ca and U by lanthanons; orthorhombic. Occurs in an unoxidized zone of the Ningyo-toge mine, Tottori prefecture, Japan. Named from the locality. [M.A. **14**–415.]

Niobanatase. E. I. Semenov, 1957. Труды Инст. Мин., Геохим., Крист., Редк. Элем. (Trans. Inst. Min. Geochem. Cryst. Rare Elements), no. 1, p. 41 (Ниобоанатаз, Nb-анатаз). Abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1959, vol. 88, p. 311 (Ниобанатаз, niobanatase). An incompletely analysed mineral (TiO_2 31·1, Nb_2O_5 21·6%) from natrolite-lined cavities in the Lovozero massif, Kola peninsula. X-ray powder photographs resemble those of anatase. [M.A. **14**–278.] The name is premature with only 53% of the composition accounted for.

Niobobelyankinite. E. I. Semenov, 1957. Труды Инст. Мин., Геохим., Крист., Редк. Элем. (Trans. Inst. Min. Geochem. Cryst. Rare Elements), no. 1, p. 41 (Ниобобелянкинит, Nb-белянкнит). Syn. of Gerasimovskite (q.v.).

Niobozirconolite. L. S. Borodin, A. V. Bykova, T. A. Kapitonova, and Yu. A. Pyatenko, 1960. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 134, p. 1188 (Ниобоцирконолит). An unnecessary name for a niobian zirconolite from the Vuorijarvi massif, Kola peninsula.

Nobleite. R. C. Erd, J. F. McAllister, and A. C. Vlisidis, 1961. Amer. Min., vol. 46, p. 560. $CaB_6O_{10}.4H_2O$, monoclinic crystals with other borates from Furnace Creek, Death Valley, California. Named after Dr. Levi F. Noble of the U.S. Geol. Survey.

Norsethite. C. Milton, M. E. Mrose, E. C. T. Chao, and J. J. Fahey, 1959. Bull. Geol. Soc. Amer., vol. 70, p. 1646 (abstract); Amer. Min., 1961, vol. 46, p. 420. $BaMg(CO_3)_2$, in rhombohedral crystals in the Westvaco trona mine, Wyoming. Named after Mr. Keith Norseth, engineering geologist. [M.A. **14**–343.]

Novacikit, error for Nováčekit (F. Machatschki, Spez. Min., Wien, 1953, pp. 348, 370).

Novákite. Z. Johan and J. Hak, 1959. Chemie der Erde, vol. 20, p. 49 (Novákit). Arsenide of Cu and Ag, occurring in carbonate gangue

at Černy Důl (Schwarzenthal), Czechoslovakia. Named after Prof. Jiři Novák of Prague. The formula is given as $(Cu,Ag)_4As_3$ or $(Cu,Ag)_{11}As_8$, but 'the constants given lead to a cell content of $(Cu,Ag)_{26\cdot5}As_{19\cdot9}$' (M. Fleischer, Amer. Min., 1959, vol. 44, p. 1321).

Obvenite, error for Olivenite (Amer. Min., 1959, vol. 44, p. 1321).

Octobolite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 291 (Oktobolit). Syn. of Augite.

Orcelite. S. Caillère, J. Avias, and J. Falgueirettes, 1959. Compt. Rend. Acad. Sci. Paris, vol. 249, p. 1771 (Orcélite). Bull. Soc. franç. Min. Crist., 1961, vol. 84, p. 9. A vein in serpentinized harzburgite in the Tiebaghi massif, New Caledonia, consists almost wholly of a new mineral, Ni_2As, distinct from maucherite and niccolite. Named after Prof. J. Orcel. [M.A. **14**–342.] Probably identical with the artificial phase $Ni_{5-x}As_2$ (M. Fleischer, Amer. Min., 1960, vol. 45, p. 753).

Ordite. Yu. M. Abramovich, 1956. [Вопросы мин. осад. образ. (Problems Min. Sedim. Formations), Lvov Univ., Book 3–4, p. 80]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc., 1959, vol. 87, p. 481 (Ордит). A name for a pseudomorph of gypsum from Orda, Perm region; named for the locality. [M.A. **14**–277.] An unnecessary name; confusion with Орлит (Orlite, 21st List) is likely.

Oregonite. P. Ramdohr and M. Schmitt, 1959. Neues Jahrb. Min., Monatsh., p. 239 (Oregonit). Probably Ni_2FeAs_2; hexagonal. From Josephine Creek, Josephine Co., Oregon. Named from the locality. [M.A. **14**–500.]

Orthochamosite. F. Novák, J. Vtelensky, J. Losert, F. Kupa, and Z. Valcha, 1957. [Czech Acad. Sci., F. Slavík Memorial Vol., p. 315]; abstr. Amer. Min., 1958, vol. 43, p. 792. The orthorhombic polymorph described by Brindley (Min. Mag. **29**–502).

Orthopinakiolite. R. Randmets, 1961. Arkiv Min. Geol., vol. 2, p. 551. Orthorhombic polymorph of pinakiolite, $Mg_3Mn^{\cdot\cdot}Mn_2^{\cdot\cdot\cdot}B_2O_{10}$, as black needles in dolomite from Långban, Sweden. The 'pinakiolite' of Bäckström (1895) was in fact orthopinakiolite.

Orthotorbernite. H. Strunz, 1961. Der Aufschluss, p. 25 (Orthotorbernit). Syn. of Torbernite.

Oxykaersutite. K. Aoki and H. Matsumoto, 1959. Journ. Japan Assoc. Min. Petr. Econ. Geol., vol. 43, p. 248. A variety of kaersutite from Iki island, Nagasaki prefecture, Japan, characterized by a high Fe_2O_3 : FeO ratio, high refractive indices, and strong pleochroism. [M.A. **15**–44.]

Pageit, error for Paigeite (Hintze, Handb. Min., Erg.-Bd. II, 1959, p. 673).

Pandaite. E. Jäger, E. Niggli, and A. H. van der Veen, 1959. Min. Mag., vol. 32, p. 10. A member of the pyrochlore group containing Ba and Sr, with only small amounts of other bases, and much water, occurring in a carbonatite at Panda Hill, Mbeya, Tanganyika. Named from the locality.

Pao-t'ou-k'uang, *see* Baotite.

Papagoite. C. O. Hutton and A. C. Vlisidis, 1960. Amer. Min., vol. 45, p. 599. Near $CaCuAlSi_2O_6(OH)_3$; monoclinic blue crystals from Ajo, Pima Co., Arizona. Named from the tribe that formerly inhabited the region. [M.A. **15**–44.]

Para-autunite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 254 (Para-Autunit). Anhydrous $Ca(UO_2)_2(PO_4)_2$; artificial.

Paradamin, variant of Paradamite (21st List). (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 228.)

Parapechblende, *see* Parapitchblende.

Parapitchblende. J. Geffroy and J. A. Sarcia, 1954. [Sciences de la terre, Univ. Nancy, vol. 2, p. 1]; abstr. in Amer. Min., 1958, vol. 43, p. 792; Hintze, Handb. Min., Erg.-Bd. II, p. 810 (Parapechblende). A black, isotropic alteration product of pitchblende from Bauzot and Ruaux, Saône-et-Loire, France. Inadequately described, and probably not a valid species.

Paratellurite. G. Switzer and H. E. Swanson, 1960. Amer. Min., vol. 45, p. 1272. The tetragonal modification of TeO_2, found at Cananea, Sonora, Mexico.

Para-uranite. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 252, 254 (Para-Uranit). The fully dehydrated, anhydrous series of compounds corresponding to the autunite group.

Parbigite. Y. V. Mirtov, 1958. [Вес. Зап.-Сиб. Новосиб. Геол. Упр. (Bull. West-Siberian and New Siberian Geol. Dept.), no. 1, p. 72]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1959, vol. 88, p. 318 (Парбигит, Parbighite). Incompletely characterized; a phosphate of the collinsite-fairfieldite family, but optically negative. Found in sandstone from a borehole near Parbig, Tomsk, Siberia. Named from the locality. [M.A. **14**–278.] Probably messelite; evidence for a new name quite inadequate (M. Fleischer, Amer. Min., 1960, vol. 45, p. 256).

Paulingite. W. B. Kamb and W. C. Oke, 1960. Amer. Min., vol. 45, p. 79. A cubic zeolite, forming rhombic dodecahedra, from the Columbia River at Rock Island Dam, Wenatchee, Washington. Chemical analyses unsatisfactory. Named after Prof. Linus Pauling. [M.A. **15**-135.]

Paulite. H. W. Bultemann, 1960. [Der Aufschluss, vol. 11, no. 11, p. 281]; abstr. Amer. Min., 1961, vol. 46, p. 465. Thin light yellow tablets from uranium deposits at Bühlskopf, Ellweiler, Birkenfeld, Germany, contain Al, U, and As; it is suggested that they are the As analogue of sabugalite, and the name Paulite is proposed after Hans Paul. The name paulite has been used before (Werner, 1812), and the material is not adequately characterized.

Perite. M. Gillberg, 1961. Arkiv Min. Geol., vol. 2, p. 565. $PbBiO_2Cl$, small orthorhombic plates with hausmannite, calcite, &c., from Långban, Sweden, and artificial. Named after Prof. Per Geijer.

Petersberg-Illite. R. A. Koch, 1958. Neues Jahrb. Min., Monatsh., p. 168 (Petersberg-Illit). A variety of illite distinguished by birefringence, exchange capacity, staining reactions, d.t.a. curve, &c., from typical illite.

Phosphate-schultenite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 224 (Phosphat-Schultenit). Artificial $PbHPO_4$, the phosphate analogue of schultenite.

Plattnerite, error for Planerite (Hintze, Handb. Min., Erg.-Bd. II, 1960, p. 815).

Potassium boltwoodite, syn. of Boltwoodite (21st List). *See* Ammonium boltwoodite.

Potassium gastunite, *see* Gastunite (of Honea).

Poterite, error for Potarite (Mellor, Treatise Inorg. Chem., vol. 15, p. 649).

Praguite. R. Barta and C. Barta, 1956. [Журн. прикл. хим. (Journ. Appl. Chem.), vol. 29, p. 341]; referred to by S. O. Agrell and J. V. Smith, Acta Crist., 1957, vol. 10, p. 761 (Praguite). Syn. of β-Mullite.

Proto-amphibole. G. V. Gibbs, F. D. Bloss, and H. R. Shell, 1960. Amer. Min., vol. 45, p. 974. A name for a series of artificial orthorhombic fluor-amphiboles having only half the a-dimension of anthophyllite. The presence of Li and absence of Ca appears to be essential to their formation. Named because of a structural relation to proto-enstatite.

Pseudochlorite. V. A. Frank-Kamenetsky, 1958. Referred to by R. C. Mackenzie, Clay Min. Bull., 1959, vol. 4, p. 61. A term for the cronstedtite–amesite–berthierine group; syn. of septechlorite (q.v.).

Pseudolussatine. O. Braitsch, 1957. Heidelberger Beitr. Min. Petr., vol. 5, p. 331 (Pseudolussatin). A structural modification of low-cristobalite differing from lussatine.

Pseudo-quartzine. O. Braitsch, 1957. Heidelberger Beitr. Min. Petr., vol. 5, p. 331 (Pseudoquarzin). A structural modification of quartz, differing from quartzine.

Pyrochlore-wiikite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 147 (Pyrochlor-Wiikit). Wiikite (3rd List) is subdivided into pyrochlore-wiikite, samarskite-wiikite, and silicate-wiikite (qq.v.).

Ranquilite. M. Jimenez de Abeledo, M. Rodriguez de Benyacar, and E. E. Galloni, 1960. Amer. Min., vol. 45, p. 1078. Near $3CaO.4UO_3.10SiO_2.24H_2O$, microcrystalline, orthorhombic, with gypsum from the Ranquil–C6 area, Portezuelo Hill, Malargue Dept., Mendoza Prov., Argentina. Named from the locality.

Rassoulite, error for or syn. of Ghassoulite (20th List) (Bull. groupe franç. argiles, vol. 8, p. 37).

Rathite–I, Rathite–II, Rathite–III. Marie-Thérèse Le Bihan, 1959. Compt. Rend. Acad. Sci. Paris, vol. 249, p. 719; ibid. 1960, vol. 251, p. 2196. Three distinct structures: Rathite–I 'parait s'identifier au minéral nommé "Rathite" ou plutôt au minéral "sans nom" . . . decrit par Solly (1919)'; it has formula $Pb_7As_9S_{20}$, *a* 8·43, *b* 25·80, *c* 7·91 Å., β 90° 15′. Rathite–II is also $Pb_7As_9S_{20}$ but has *a* 8·43, *b* 72, *c* 7·91 Å., β 90° 15′. Rathite–III has *a* 8·43, *b* 7·91, *c* 24·40 Å., β 90° 15′, and composition $Pb_6As_{10}S_{20}$.

Reinerite. B. H. Geier and K. Weber, 1958. Neues Jahrb. Min., Monatsh., p. 160 (Reinerit). Pale yellow-green orthorhombic crystals from Tsumeb, South-West Africa, have the composition $Zn_3(AsO_3)_2$; a sea-blue variety contains 2% CuO. Named after Mr. Willy Reiner. [M.A. **14**–282.] An unfortunate name, easily confused with renierite (18th List, also from Tsumeb).

Revoredite. G. C. Amstutz, P. Ramdohr, and F. De Las Casas, 1957. [Soc. Geol. Peru, Ann., pt. 2, p. 25]; abstr. Amer. Min., 1958, vol. 43, p. 794. Cf. C. Milton and B. Ingram, Amer. Min., 1959, vol. 44, p. 1070. A natural Pb–S–As glass from Cerro de Pasco, Peru. There appears to be a continuous amorphous series from As_2S_3 to $2As_2S_3.PbS$ and probably beyond. The name was proposed by Amstutz, Ramdohr, and De Las Casas, after Dr. J. F. A. Revoredo, 'in case a crystalline sample should be found'; Milton and Ingram consider the name should be rejected.

Rezhikite. M. V. Soboleva and N. D. Sobolev, 1959. Совет. Геол.,

no. 9, p. 94. A deep blue amphibole asbestos near magnesioriebeckite and magnesioarfvedsonite but differing somewhat in optics. A premature name.

Rozenite. J. Kubisz, 1960. Bull. Acad. Polon. Sci., Sér. sci. géol. géogr., vol. 8, p. 107. $FeSO_4.4H_2O$, isomorphous with ilesite and leonhardtite, from Ornak, western High Tatra, Poland, and from the Staszic mine, Rudki, Poland. Optical data show that it is identical with siderotile, the water content of which has hitherto been uncertain. An unnecessary name.

Rusakovite. E. A. Ankinovich, 1960. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 89, p. 440 (Русаковит). Abstr. ibid. 1961, vol. 90, p. 443 (Русаковит, rusacovite), and Bull. Soc. franç. Min. Crist., 1961, vol. 84, p. 1075 (Rusacovite). (Fe,Al $\{(V,P)O_4\}_2(OH)_9.3H_2O$, from Balasauskandyk, Karatau, Kazakhstan. Named after M. P. Rusakova (Михаила Петровича Русакова).

Rustenite, error for Ruténite (Hintze, Handb. Min., Erg.-Bd. II, 1958, p. 612).

Rustonite. K. F. Chudoba, 1958. Hintze, Handb. Min., Erg.-Bd. II, p. 612. Said to be a synonym of Ruthenosmiridium.

Sakharovaite. Ivan Kostov, 1959. Труды Мин. Муз. Акад. Наук СССР (Trans. Min. Mus. Acad. Sci. USSR), vol. 10, p. 148 (Сахароваит). The mineral named bismuth-jamesonite by M. S. Sakharova (21st List) is regarded as a distinct species and named after its describer. [M.A. **13**–164; **14**–500.]

Samarskite-wiikite. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 147, 158 (Samarskit-Wiikit). *See* Pyrochlore-wiikite (this List).

Sandbergerite. K. Walenta, 1958. [Techn. Hochschule, Stuttgart]; abstr. Bull. Soc. franç. Min. Crist., 1958, vol. 81, p. 69. The mineral later re-named heinrichite (q.v.), the name sandbergerite having been used twice before.

Satpaevite. E. A. Ankinovich, 1959. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 88, p. 157 (Сатпаевит). Abstr. Hintze, Handb. Min., Erg.-Bd. II, p. 934 (Satpajewit); M.A. **14**–280 (Satpayevite). A yellow aluminium vanadyl vanadate near $6Al_2O_3.V_2O_4.3V_2O_5.30H_2O$ in minute weakly pleochroic flakes in the argillaceous anthraxolitic vanadiferous deposits of Kurumsak and Balasanskandyk, Karatau, Kazakhstan. Named after K. I. Satpaev. [M.A. **14**–280.] The colour is unexpected for a mineral containing both V^{4+} and V^{5+} (M. Fleischer, Amer. Min., 1959, vol. 44, p. 1326).

Sc-beryl. G. Bergerhoff and W. Nowacki, 1955. Schweiz. Min. Petr. Mitt., vol. 35, p. 410 (Sc-Beryll). Syn. of Bazzite (7th List).

Schapbacite, error for Schapbachite (Econ. Geol., 1960, vol. 55, pp. 762, 763, 782).

Scherbakowit, erroneous German transliteration of Щербаковит, shcherbakovite (20th List) (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 278).

Schoderite. D. M. Hausen, 1960. Bull. Geol. Soc. Amer., vol. 71, p. 1883. Orange microcrystalline coatings on sandstone from Eureka, Nevada, have the composition $2Al_2O_3.V_2O_5.P_2O_5.12H_2O$. Named after William P. Schoder. [M.A. **15**–44.]

Schoepite–I, Schoepite–II, Schoepite–III. C. L. Christ and J. R. Clark, 1960. Amer. Min. vol. 45, pp. 1027, 1028. Synonyms respectively of Schoepite (10th List), Metaschoepite (this List), and Paraschoepite (18th List).

Schorsuit, German transliteration of Шорсуит, shorsuite (21st List) (Hintze, Handb. Min., Erg.-Bd. II, p. 614).

Schtscherbakowit, German transliteration of Щербаковит, shcherbakovite (21st List) (Hintze, Handb. Min., Erg.-Bd. II, p. 833).

Schuetteïte. E. H. Bailey, F. A. Hildebrand, C. L. Christ, and J. J. Fahey, 1959. Amer. Min., vol. 44, p. 1026 (Schuetteite). Basic mercuric sulphate, $HgSO_4.2HgO$, yellow, hexagonal, from Nevada, California, Oregon, and Idaho. Named after Curt Nicolaus Schuette. [M.A. **14**–501.]

Scotite, error for Scawtite (12th List) (Crystallography, a translation of Кристаллография, 1961, vol. 5, p. 659).

Seidozerite. E. I. Semenov, M. E. Kazakova, and V. I. Simonov, 1958. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 87, p. 590 (Сейдозерит). V. I. Simonov and N. V. Belov, Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), 1958, vol. 122, p. 473. Abstr. Bull. Soc. franç. Min. Crist., 1959, vol. 82, p. 93 (Seidoserite). Fan-like clusters of brownish-red needles embedded in microcline in an alkali pegmatite from near Lake Seidozero, Lovozero tundra, Kola peninsula, near $Na_8Zr_3Ti_3Mn_2Si_8O_{32}F_4$. Named from the locality. [M.A. **14**–198.] A member of the wöhlerite family, and in need of full examination (M. Fleischer, Amer. Min., 1959, vol. 44, p. 468).

Selenide-spinel. F. Machatschki, 1958. Tschermaks Min. Petr. Mitt., ser. 3, vol. 6, p. 402 (Selenidspinell). A name proposed for the unnamed cobalt–nickel–copper selenide of S. C. Robinson and E. J. Brooker (1952). *See* Tyrellite.

Septeamesite. W. R. Phillips, 1954. Syn. of Amesite; *see* Septechlorite, this List.

Septeantigorite. W. R. Phillips, 1954. [Ph.D. Thesis, Univ. Utah]: quoted by W. M. Tuddenham and R. J. P. Lyon, Anal. Chem., 1959, vol. 31, p. 377. A member of the amesite–cronstedtite–berthierine family having a composition near that of antigorite. *See* Septechlorite, this List.

Septechamosite. B. W. Nelson and R. Roy, 1958. Amer. Min., vol. 43, p. 721. Syn. of Berthierine. *See* Septechlorite, this List.

Septechlorite. B. W. Nelson and R. Roy, 1954. [Clays and clay minerals. Publ. Nat. Acad. Sci. & Nat. Res. Council, Washington, no. 327, p. 335]; abstr. Amer. Min., 1958, vol. 43, p. 707. A group name for the amesite–cronstedtite–berthierine family, dimorphous with the chlorites; the name refers to the 7 Å. *c*-spacing characteristic of this family.

Septekämmererite. W. R. Phillips, 1954. [Ph.D. Thesis, Univ. Utah]; quoted by W. M. Tuddenham and R. J. P. Lyon, Anal. Chem., 1959, vol. 31, p. 377. A member of the amesite–cronstedtite–berthierine (septechlorite) family having the same composition as kämmererite.

Sewerginit, German transliteration of Севергинит, severginite (21st List) (Hintze, Handb. Min., Erg.-Bd. II, p. 838).

Shentulite. Peng Ch'i-Jui, 1959. [Ti-chih K'o-hsueh, vol. 10, p. 289]: abstr. Amer. Min., 1960, vol. 45, p. 755 (Shen-t'u-shih). $(Th,Fe,Ca,Ce)\{(Si,P,As)O_4,CO_3OH\}$; metamict. An unnecessary name for a variety of thorite or thorogummite. *See* Arsenothorite (this List).

Sherwoodite. M. E. Thompson, C. H. Roach, and R. Meyrowitz, 1958. Amer. Min., vol. 43, p. 749. Near $Ca_3V_8O_{22}.15H_2O$, blue-black tetragonal prisms from numerous vanadium mines on the Colorado plateau. Named after Dr. Alexander M. Sherwood of the U.S. Geological Survey. [M.A. **14**–141.]

Silberspießglanze. H. Strunz, 1957. Min. Tabellen, 3rd edn, pp. 86, 105. A group name, including smithite, trechmannite, pavonite, bolivian, tapalpite, stephanite, pearceite, and polybasite. Not to be confused with Silberspießglanz of early German authors (Dana, Syst. Min., 6th edn, p. 42), a synonym of dyscrasite.

Silicate-wiikite. H. Strunz 1957. Min. Tabellen, 3rd edn, pp. 147, 158 (Silikat-Wiikit). *See* Pyrochlore-wiikite (this List).

Silicoglaserite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 263 (Silicoglaserit). A name for high-temperature α-Ca_2SiO_4 (Strunz inverts

the usual designations, calling the low-temperature form α-Ca_2SiO_4 and the high γ).

Silikatsulfatapatit. F. Machatschki, Spez. Min., Wien, p. 330. Syn. of Wilkeite.

Sinicite. Ho Chen-Tsi and Chun Chi-Chen, 1957. [Kexue Tongbao (Scientia), no. 12, p. 378]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1958, vol. 87, p. 479 (Синисит, sinicite) and Amer. Min., 1959, vol. 44, p. 467. A tantaloniobate of rare earths and Th from an undefined locality in China. A species of doubtful validity.

Smirnowit, German transliteration of Смирновит, smirnovite (21st List) (Hintze, Handb. Min., Erg.-Bd. II, p. 842).

Smirnowskit, German transliteration of Смирновскит, smirnovskite (21st List) (Hintze, Handb. Min., Erg.-Bd. II, p. 843).

Smoljaninowit, German transliteration of Смоляниновит, Smolyaninovite (21st List) (Hintze, Handb. Min., Erg.-Bd. II, p. 844).

Sodium boltwoodite, *see* Ammonium boltwoodite.

Sodium gastunite, *see* Gastunite (of Honea).

Sokolovite. A. K. Sharova and A. K. Gladovsky, 1958. [Отдел геол.-геогр. Наук, Акад. Наук СССР, 1958, p. 70]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 103 (Соколовит, sokolovite) and Amer. Min., 1961, vol. 46, p. 243. Near $2(Ca,Sr)O.4Al_2O_3.P_2O_5.11H_2O$, in cavities in the Sokolov bauxite deposits, middle Urals. Named from the locality. Doubtful; the composition is near to goyazite and crandallite, but the X-ray data agree rather closely with svanbergite and woodhouseite. It is not stated whether $SO_4^{\cdot\cdot}$ was tested for.

Spencite. C. Frondel, 1961. Canad. Min., vol. 6, p. 576. A dark brown metamict borosilicate of Ca and Y, near $(Ca,Fe)_2Y_3B_3(Si,Al)_5(O,OH)_{20}$, from Cardiff township, Haliburton Co., Ontario. Named after Hugh S. Spence who collected the material in 1934.

Spherobertrandite. E. I. Semenov, 1957. Труды Инст. Мин., Геохим., Крист., Редк. Элем. (Trans. Inst. Min. Geochem. Cryst. Rare Elements), no. 1, p. 64 (Сферобертрандит). Abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1958, vol. 87, p. 485 (Сферобертрандит, spherobertrandite), Amer. Min., 1958, vol. 43, p. 1219 (spherobertrandite), and M.A. **14**–277 (sphaerobertrandite). Bertrandite high in BeO and low in SiO_2, from pegmatites in the Khibina and Lovozero tundras, Kola peninsula. 'L'individualité de la sphérobertrandite n'est pas démontrée' (Bull. Soc. franç. Min. Crist., 1959, vol. 82, p. 91).

Stepanowit, German transliteration of Степановит, stepanovite (20th List) (Hintze, Handb. Min., Erg.-Bd. II, p. 848).

Stottite. H. Strunz, G. Söhnge, and B. H. Geier, 1958. Neues Jahrb. Min., Monatsh., p. 85 (Stottit). Ferrous germanate, $Fe^{\cdot\cdot}Ge(OH)_6$, tetragonal, occurring with tennantite and renierite at Tsumeb, South-West Africa. Named after Mr. Charles E. Stott. [M.A. **14**–281.] *See also* J. Zemann, Neues Jahrb. Min., Monatsh., 1959, p. 67, and H. Strunz and M. Giglio, Fortschr. Min., 1960, vol. 38, p. 40.

Stranskiite. H. Strunz, 1960. Naturwiss., vol. 47, p. 376 (Stranskiit). $Zn_2Cu(AsO_4)_2$, anorthic, blue crystals, from Tsumeb, South-West Africa, and synthetic. Named after Prof. I. N. Stranski of Berlin.

Strontioborite. V. V. Lobanova, 1960. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 135, p. 173 (Стронциоборит). Near $(Sr,Ca)_2MgB_{12}O_{21}.4\frac{1}{2}H_2O$, in soils from the Caspian region. 'Requires verification. Some of the data could be construed as indicating a mixture of strontioginorite, boracite, and anhydrite' (M. Fleischer, Amer. Min., 1961, vol. 46, p. 768).

Strontioginorite. O. Braitsch, 1959. Beitr. Min. Petr., vol. 6, p. 366. A strontian variety of ginorite, $(Sr,Ca)_2B_{14}O_{23}.8H_2O$, from the 'Old Halite' bed of the Königshall-Hindenburg mine, Reyershausen, Germany. The unit cell and refractive indices are near those of volkovite (20th List). Cf. Strontium ginorite (this List).

Strontiohilgardite-1Tc. O. Braitsch, 1959. Beitr. Min. Petr., vol. 6, p. 233 (1Tc-Strontiohilgardit). $(Ca,Sr)_2B_5O_8(OH)_2Cl$, from the Königshall-Hindenburg mine, Reyershausen, Germany. Apart from a higher strontium content (not in itself a good reason for a new name), this anorthic mineral differs from parahilgardite (calciumhilgardite-3Tc) by having a *c*-axis of 6·61 Å instead of 17·50 Å.

Strontium apatite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 235 (Strontium-Apatit). An unnecessary name for strontian apatite.

Strontium ginorite. O. Braitsch, 1959. Beitr. Min. Petr., vol. 6, p. 370 (Strontiumginorit). The strontium analogue of ginorite, $Sr_2B_{14}O_{23}.8H_2O$, as distinct from Strontioginorite (q.v.).

Subglaucophane. A. Miyashiro, 1957. Journ. Fac. Sci. Univ. Tokyo, sect. 2, vol. 11, p. 57. A name for the clino-amphibole end-member $Na_2Mg^{\cdot\cdot}_{1\frac{1}{2}}Fe(Al,Fe^{\cdot\cdot\cdot})Si_8O_{22}(OH)_2$ with $Fe^{\cdot\cdot\cdot}$ 0·3 to 0·7.

Sulunite. A. A. Nyrkov, 1959. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 88, p. 571 (Сулунит). Hydrous aluminosilicate of alkalis and ferric iron, described as a new mineral of the

chlorite group, from the Sulin region of the Donetz basin; named from the locality. The X-ray data are said to be comparable to gümbelite, a hydromuscovite. [M.A. **14**–501; Amer. Min., **45**–478.] The analysis is unsatisfactory, and the material, which is high in alkalis, may well be a mixture. Cf. D. P. Serdyuchenko and N. V. Belov, Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1960, vol. 89, p. 367.

Tacharanite. J. M. Sweet, 1961. Min. Mag., vol. 32, p. 745. $(Ca,Mg,Al)(Si,Al)O_3.H_2O$, with gyrolite, tobermorite, and mesolite in dolerite from Portree, Isle of Skye. Readily changes to a mixture of tobermorite and gyrolite. Named from the Gaelic *tacharan*, a changeling.

Tacherite. German transliteration of Тахерит, takherite (Hintze, Handb. Min., Erg.-Bd. II, p. 858).

Takovite. Z. Maksimović, 1957. [Zapis. srp. geol. drustva zo 1955 god. (Compt. Rend. Soc. serbe Géol., ann. 1955), p. 219]; abstr. M.A. **13**–624 and Hintze, Handb. Min., Erg.-Bd. II, p. 858 (Takowit). A blue-green massive clay-like mineral, $Ni_5Al_4O_2(OH)_{18}.6H_2O$, from Takovo, Serbia. Named from the locality.

Talmessite. P. Bariand and P. Herpin, 1960. Bull. Soc. franç. Min. Crist., vol. 83, p. 120. $Ca_2(Mg,Ba)(AsO_4)_2.2H_2O$, anorthic and isomorphous with β-Roselite. Named from the locality, the Talmessi mine, Anarak, Iran. [M.A. **15**–45.]

Tangaite. D. McKie, 1958. Records Geol. Surv. Tanganyika, vol. 5 (for 1955), p. 81. $AlPO_4.2H_2O$ (with $3\frac{1}{2}\%$ Fe_2O_3, 1% Cr_2O_3) from Gerevi Hill, Tanga district, Tanganyika, is essentially a low-iron redondite and not a variscite. Named from the locality. The name is liable to confusion with tangeïte.

Tarankite, error for Taranakite (Amer. Min., 1959, vol. 44, p. 138).

Thiospinels. J. Flahaut, L. Domange, and M. Ourmitchi, 1960. Compt. Rend. Acad. Sci. Paris, vol. 250, p. 134 (thiospinelles). A general term for compounds AB_2S_4 with spinel-type structures.

Titanohaematite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 144. Another variant of Titanohematite. The attribution of this variant to L. J. Spencer in Hintze, Handb. Min., Erg.-Bd. II, p. 867, is in error.

Titanomaghemite. E. Z. Basta, 1959. Econ. Geol., vol. 54, p. 698. An unnecessary varietal name for titanian maghemite.

Tomazit, error for Tombazit (H. Strunz, Min. Tabellen, 3rd edn, p. 421).

Transvaalite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 51 (Transvaalit). Cobaltous hydroxide, $Co(OH)_2$; no natural occurrence

mentioned. Not to be confused with transvaalite of McGhie and Clark (Dana, Syst. Min., 6th edn, p. 260), a hydrous cobaltic oxide near heterogenite.

Trevolite, error for Trevorite (Journ. Min. Soc. Japan, 1959, vol. 4, p. 137).

Tschkalowit, German transliteration of Чкаловит, chkalovite (H. Strunz, Min. Tabellen, 3rd edn, p. 149).

Tungsto-powellite, variant of Tungsten-powellite (19th List) (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 216, Tungsto-Powellit).

Tuvite. N. N. Shishkin and V. A. Mikhailova, 1956. [Сборн. Мат. Тех. Инф. (Collect. Mat. Tech. Inform.), no. 6, Gipronickel, p. 5]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1959, vol. 88, p. 317 (Тувит, tuvite). Imperfectly characterized yellow oxidation products of smaltite and safflorite from the Khovaks deposit, Tuva. Named from the locality. [M.A. **14**–278; Amer. Min. **45**–256.] Cf. Yellow earthy cobalt, Dana, Syst. Min., 6th edn, p. 78. A wholly unnecessary name.

Tyrrellite. I. D. Sindeeva, 1959. [Минералогия (Mineralogy), publ. Acad. Sci., USSR, p. 58]; quoted in Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 92 (Тирреллит, tyrrellite); Index to the X-ray powder data file, 1960, p. 298. The unnamed $(Cu,Co,Ni)_3Se_4$ of S. C. Robinson and E. J. Brooker, 1952, named by S. C. Robinson after Joseph Burr Tyrrell. Д. У. Тиррелл in Bonshtedt-Kupletskaya's list is an error. *See also* Selenide-spinel (this List).

Uramphite. Z. A. Nekrasova, 1957. [Вопросы Геол. Уран. (Problems Geol. Uranium), Атомиздат., p. 67]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1958, vol. 87, p. 483 (Урамфит, uramphite). Proc. 2nd U.N. Internat. Conf. Peaceful Uses Atomic Energy, 1958, vol. 2, p. 286. $NH_4UO_2PO_4.3H_2O$, occurring as bottle-green flakes in the oxidation zone of a uranium–coal deposit; locality not given. Named from the composition, *ur*anium *am*monium *ph*osphate. [M.A. **14**–277, 344.]

Uran-apatite. I. G. Chentzov, 1956. [Атом. Энерг. (Atomic energy), no. 5, p. 113]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1958, vol. 87, p. 482 (Уран-апатит, uran-apatite). An unnecessary name for a uranian apatite with 1 to 4% UO_2.

Urquhartite. M. F. Heddle, 1878. Trans. Roy. Soc. Edinburgh, vol. 28, p. 310. A name for a wholly undefined mineral in the gneiss of Milton, Glen Urquhart, Scotland. Named from the locality.

Ursilite. A. A. Chernikov, O. V. Krutetzkaya, and V. D. Sidelnikova, 1957. [Вопросы Геол. Уран (Problems Geol. Uranium), Атомиздат.,

p. 73]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1958, vol. 87, p. 486 (Урсилит, ursilite). $2(Ca,Mg)O.2UO_3.5SiO_2.9H_2O$, earthy masses or spherulites in quartz-porphyry (locality not given). Two varieties occur, calcium-ursilite (кальцийурсилит) with Ca $\gg$ Mg and magnesium ursilite (магнийурсилит) with Mg $\gg$ Ca. Named from the composition, *ur*anium *sil*icate. See also Proc. 2nd U.N. Internat. Conf. Peaceful Uses Atomic Energy, vol. 2, p. 295 (Calcium urcilite, magnesium urcilite). [M.A. **14**–277, 344.] Calcium ursilite is very near haiweeite (q.v.) in composition but has a different powder pattern (K. Walenta, Neues Jahrb. Min., Monatsh., 1960, p. 37).

Vandendriesscheite–I, Vandendriesscheite–II. C. L. Christ and J. R. Clark, 1960. Amer. Min., vol. 45, p. 1031. Synonyms respectively of Vandendriesscheite (18th List) and Metavandendriesscheite (this List).

***p*-Veatchite.** O. Braitsch, 1959. Beitr. Min. Petr., vol. 6, p. 352 (*p*-Veatchit); C. A. Beevers and F. H. Stewart, Min. Mag., 1960, vol. 32, p. 500. A polymorph of veatchite, crystallizing in space-group $P2_1/m$ or possibly $P2_1$; the space-group of veatchite is $A2/a$ or perhaps Aa. The prefixed p is for 'einfach-*p*rimitivem Raumgitter'. It would have been preferable to use a suffix and avoid any danger of displacement in an index.

Vibertite. N. R. Goodman, 1957. [The geology of Canadian industrial mineral deposits, p. 110]; abstr. Amer. Min., 1958, vol. 43, p. 791. Syn. of Bassanite (6th List).

Vlasovite. R. P. Tikhonenkova and M. E. Kazakova, 1961. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 137, p. 944 (Власовит, vlasovite). $Na_2ZrSi_4O_{11}$, colourless monoclinic crystals from the contact zone of the Lovozero massif, Kola peninsula. Named after K. A. Vlasov.

Vulcanite. E. N. Cameron and I. M. Threadgold, 1961. Amer. Min., vol. 46, p. 258. CuTe, with rickardite and native tellurium, as coatings on rock fragments from the Good Hope mine, Vulcan, Gunnison Co., Colorado; also synthetic. Orthorhombic. Named from the locality.

Wawellit, error for Wavellite (Hintze, Handb. Min., Erg.-Bd. II, p. 543).

Weeksite. W. F. Osterbridge, M. H. Staatz, R. Meyrowitz, and A. M. Pommer, 1960. Amer. Min., vol. 45, p. 39. $K_2(UO_2)_2(Si_2O_5)_3.4H_2O$, orthorhombic, from the Thomas range, Juab Co., Utah, and elsewhere. Resembles uranophane in appearance. Named after Dr. Alice D. Weeks.

Woodfordite. J. Murdoch and R. A. Chalmers, 1958. Bull. Geol. Soc. Amer., vol. 69, p. 1620 (abstract); Amer. Min., 1960, vol. 45, p. 1275.

A variety of ettringite containing significant amounts of SiO_2 and CO_2, with afwillite and calcite from the Commercial quarry, Crestmore, California. Named after Prof. A. O. Woodford who found the mineral. The name was later withdrawn.

Wolfram-Powellit, Germanized version of Tungsten-powellite (19th List) (H. Strunz, Min. Tabellen, 3rd edn, 1957, p. 216).

Wyartite. C. Guillemin and J. Protas, 1959. Bull. Soc. franç. Min. Crist., vol. 82, p. 80. The 'ianthinite' of Bignand [M.A. **12**–587] is distinct from the type ianthinite of Schoep, and is named wyartite after Prof. J. Wyart. It is a calcium uranium carbonate, near $3CaO.UO_3.6UO_3.2CO_2.12$–$14H_2O$, and occurs with ianthinite on uraninite from Shinkolobwe, Katanga. [M.A. **14**–280.]

Yanshynshite. Cheng-Chi Kuo, 1959. [Kexue Tongbao (Scientia), no. 6, p. 206]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 108 (Яншайншит, yanshynshite). An unnecessary name for a variety of thorogummite with 12% P_2O_5, 14% CaO, and 4% Fe_2O_3.

Yavapaiite. C. O. Hutton, 1959. Amer. Min., vol. 44, p. 1105. $KFe(SO_4)_2$, monoclinic crystals on one specimen from the United Verde copper mine, Jerome, Arizona. Named after the Yavapai tribe, who inhabit the region around Jerome. [M.A. **14**–502.]

Yoderite. D. McKie, 1959. Min. Mag., vol. 32, p. 282. Near $Mg_2Al_6Si_4O_{18}(OH)_2$; a monoclinic, highly pleochroic purple mineral occurring as a quartz–yoderite–kyanite–talc schist at Mautia Hill, Kongwa, Tanganyika. Named after Dr. Hatten Schuyler Yoder of the U.S. Geological Survey.

Yoshimuraite. T. Watanabe, 1959. Min. Journ. (Japan), vol. 2, p. 408; T. Watanabe, Y. Takéuchi, and J. Ito, ibid., 1961, vol. 3, p. 156. Orange-brown tabular crystals or stellate groups in an alkali-pegmatite from the Noda-Tamagawa mine, Iwate prefecture and the Taguchi mine, Aichi prefecture, Japan; anorthic, near $(Ba,Sr)_2Mn_2(Ti,Fe)\{(P,S)O_4\}Si_2O_8OH$. Named after Prof. Toyofumi Yoshimura.

Yttererdensilikatapatit. F. Machatschki, 1953. Spez. Min., Wien, p. 330. Syn. of Abukumalite.

Zinalsite. F. V. Chukhrov, 1956. [Кора выветривания, vol. 2, p. 107]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1958, vol. 87, p. 487 (Цинальсит, zinalsite). A zinciferous clay, much higher in Zn than sauconite and apparently not of the montmorillonite family. Named from the composition, Zn, Al, Si. 'Parait être identique à la moresnetite' (Bull. Soc. franç. Min. Crist., 1958, vol. 81, p. 337).

Zinc chrysotile. W. Noll, H. Kircher, and W. Sybertz, 1960. Beitr. Min. Petr., vol. 7, p. 240 (Zinkchrysotil). The hypothetical zinc analogue of chrysotile.

Zinc-ferro-hexahydrite. J. Kubisz, 1958. Bull. Acad. Polon. Sci., Sér. sci. chim., géol., géogr., vol. 6, p. 459. Syn. of Bianchite (12th List).

Zinc-ferro-magnesio-hexahydrite. J. Kubisz, 1958. Bull. Acad. Polon. Sci., Sér. sci. chim., géol., géogr., vol. 6, p. 459. An unnecessary name for magnesian bianchite.

Zinc-hexahydrite. J. Kubisz, 1958. Bull. Acad. Polon. Sci., Sér. sci. chim., géol., géogr., vol. 6, p. 459. A name for monoclinic $ZnSO_4 . 6H_2O$, not known in nature.

Zinc-lavendulan. H. Strunz, 1959. Fortschr. Min., vol. 37, p. 89 (Zinklavendulan). An unnecessary name for zincian lavendulan from Tsumeb, $(Ca,Na)_2(Cu,Zn)_5(AsO_4)_4Cl . 4–5H_2O$.

Zinc-pisanite. H. Strunz, 1957. Min. Tabellen, 3rd edn, p. 428 (Zinkpisanit). An unnecessary name for zincian pisanite.

Zincrosasite. H. Strunz, 1959. Fortschr. Min., vol. 37, p. 89 (Zinkrosasit). A variety of rosasite having Zn > Cu; from Tsumeb, South-West Africa.

Zincsilite. N. N. Smolyaninova, V. A. Moleva, and N. I. Organova, 1960. [Rept. Meeting Internat. Comm. Study Clays, p. 45]; abstr. Amer. Min., 1961, vol. 46, p. 241. The aluminium-free end-member of the montmorillonite–sauconite series, near $Zn_3Si_4O_{10}(OH)_2 . nH_2O$; from Batystau, Kazakhstan. Named from *zinc sili*cate.

Zink-Högbohmit, erroneous German form of Zinc-högbomite (20th List). (Hintze, Handb. Min., Erg.-Bd. II, p. 893.)

Zinkmontmorillonit. F. Machatschki, 1953. Spez. Min., Wien, p. 349. Syn. of Sauconite (2nd List).

Zinkvredenburgit. H. Strunz, 1949. Min. Tabellen, 2nd edn, p. 106. An unnecessary name for the zincian vredenburgite of B. Mason (1946).

Zinkwolframit. F. Machatschki, 1953. Spez. Min., Wien, p. 315. Syn. of Sanmartinite (18th List).

Zodite. I. G. Magakyan, 1956. [Доклады Акад. Наук Арм. ССР (Compt. Rend. Acad. Sci. Armen. SSR), vol. 23, p. 215]; abstr. Зап. Всесоюз. Мин. Общ.(Mem. All-Union Min. Soc.), 1958, vol. 87, p. 76 (Зодит). A provisional name for the mineral later named Stibiotellurobismutite (21st List). Named from the locality.

CLASSIFIED LIST OF NEW MINERALS

Sulphides, Arsenides, &c.

Koutekite, Cu_2As.
Orcelite, Ni_2As.
Oregonite, Ni_2FeAs_2.
Novákite, $(Cu,Ag)_4As_3$.
Cobalt pentlandite, Co_9S_8.
Vulcanite, CuTe.
Idaite, Cu_5FeS_6.
Tyrrellite, $(Cu,Co,Ni)_3Se_4$.
Michenerite, $PdBi_2$, cubic.
Froodite, $PdBi_2$, monoclinic.
Geversite, $PtSb_2$.
Gallite, $CuGaS_2$.

Halides

Blixite, $Pb_4O_3Cl_2$.
Perite, $PbBiO_2Cl$.
Neighborite, $NaMgF_3$.

Borates

Nifontovite, $CaB_2O_4.3\frac{1}{2}H_2O$.
Nobleite, $CaB_6O_{10}.4H_2O$.
Gowerite, $CaB_6O_{10}.5H_2O$.
Orthopinakiolite, $Mg_3Mn^{\cdot\cdot\cdot}Mn^{\cdot\cdot}_2B_2O_{10}$.
Strontium ginorite, $Sr_2B_{14}O_{23}.8H_2O$.

Sulphates

Schuetteïte, $HgSO_4.2HgO$.
Fleischerite, $Pb_3Ge(SO_4)_2(OH)_4.4H_2O$.
Itoite, $Pb_3GeO_2(OH)_2(SO_4)_2$.
Chukhrovite,
$Ca_6Al_3(Y,Ln)_2(SO_4)_2F_{23}.20H_2O$.
Nasledovite, sulphate and carbonate of Pb, Mn, Mg, and Al.

Oxides

Eskolaite, Cr_2O_3.
Avicennite, Tl_2O_3.
Manganogel, amorphous MnO_2.
Paratellurite, TeO_2.
Metaschoepite, oxide of U.
Metavandendriesscheite, oxide of Pb and U.
Stottite, $Fe^{\cdot\cdot}Ge(OH)_6$.
Freudenbergite, $Na_2Fe_2Ti_7O_{18}$.
Kennedyite, $Fe_2MgTi_3O_{10}$.
Cafetite, $(Ca,Mg)(Fe,Al)_2Ti_4O_{12}.4H_2O$.
Pandaite, hydrated Ba-Sr pyrochlore.
Gerasimovskite, hydrated oxide of Nb, Zr, Ti, and Ca, with some Si, which may not be essential.

Carbonates

Norsethite, $BaMg(CO_3)_2$.
Hellyerite, $NiCO_3.6H_2O$.
Carbocernaite, $(Ca,Sr,Na,Ln)CO_3$.
Hydroscarbroite,
$Al_2(CO_3)_3.12Al(OH)_3.nH_2O$.
Zincrosasite, $(Zn,Cu)CO_3(OH)_2$.
Widenmannite, carbonate of Pb and U.
Benstonite, $Ca_7(Ba,Sr)_6(CO_3)_{13}$.
Wyartite,
$3CaO.UO_2.6UO_3.2CO_2.12$–$14H_2O$.

Vanadates

Barnesite, $Na_2V_6O_{16}.3H_2O$.
Delrioite, $CaSrV_2O_7.3H_2O$.
Satpaevite, aluminium vanadyl vanadate Sherwoodite, $Ca_3V_8O_{22}.15H_2O$.
Alvanite, $Al_3VO_4(OH)_6.2\frac{1}{2}H_2O$(?).
Schoderite, $Al_2VO_4PO_4.6H_2O$.
Gutsevichite,
$(Al,Fe)_3\{(P,V)O_4\}_2(OH)_3.7\frac{1}{2}$–$8\frac{1}{2}H_2O$.
Rusakovite,
$(Fe,Al)_5\{(V,P)O_4\}_2(OH)_9.3H_2O$.

Arsenates

Stranskiite, $Zn_2Cu(AsO_4)_2$.
Angelellite, $Fe_4As_2O_{11}$.
β-Duftite, $CuPbAsO_4OH$.
Chudobaite,
$(Na,K)(Mg,Zn)_2H(AsO_4)_2.4H_2O$.
Talmessite,
$Ca_2(Mg,Ba)(AsO_4)_2.2H_2O$.
Metauranospinite,
$Ca(UO_2)_2(AsO_4)_2.8H_2O$.
Heinrichite,
$Ba(UO_2)_2(AsO_4)_2.10$–$12H_2O$.
Metaheinrichite,
$Ba(UO_2)_2(AsO_4)_2.8H_2O$.
Metakahlerite,
$Fe(UO_2)_2(AsO_4)_2.8H_2O$.
Meta-kirchheimerite,
$Co(UO_2)_2(AsO_4)_2.8H_2O$.
Arsenuranylite,
$Ca(UO_2)_4(AsO_4)_2(OH)_4.6H_2O$.
Hallimondite, $Pb_2UO_2(AsO_4)_2.nH_2O$.
Weilerite, $BaAl_3AsO_4SO_4(OH)_6$.
Betpakdalite, arsenomolybdate of Ca and Fe.

Silicates

Kilchoanite, $Ca_3Si_2O_7$.

Zincsilite, $Zn_3Si_4O_{10}(OH)_2 . nH_2O$.
Vlasovite, $Na_2ZrSi_4O_{11}$.
Fenaksite, silicate of Fe and alkalis.
Bafertisite, $BaFe_2TiSi_2O_9$.
Batisite, $Na_2BaTi_2Si_4O_{14}$.
Ekanite, $(Th,U)(Ca,Fe,Pb)_2Si_8O_{20}$.
Weeksite, $K_2(UO_2)_2(Si_2O_5)_3 . 4H_2O$.
Boltwoodite,
$K_2(UO_2)_2(SiO_3)_2(OH)_2 . 5H_2O$.
Haiweeite, $CaU_2Si_6O_{17} . 5H_2O$.
Ranquilite, $Ca_3(UO_2)_4Si_{10}O_{27} . 24H_2O$.

ARSENITE

Reinerite, $Zn_3(AsO_3)_2$.

PHOSPHATES

Chavesite, hydrated phosphate of Ca and Mn.
Uramphite, $NH_4UO_2PO_4 . 3H_2O$.
Metabassetite, $Fe(UO_2)_2(PO_4)_2 . 8H_2O$.
Barium-phosphuranylite,
$Ba(UO_2)_4(PO_4)_2(OH)_4 . 8H_2O$.
Ningyoite, $CaU(PO_4)_2 . 1\frac{1}{2}H_2O$.

ALUMINOSILICATES

Ajoite, $Cu_6Al_2Si_{10}O_{59} . 5\frac{1}{2}H_2O$.
Papagoite, $CaCuAlSi_2O_6(OH)_3$.
Beryllosodalite, $Na_4BeAlSi_4O_{12}Cl$.
Yoderite, $Mg_2Al_6Si_4O_{18}(OH)_2$.
Tacharanite, $(Ca,Mg,Al)(Si,Al)O_3 . H_2O$.
Paulingite, aluminosilicate of Ca and alkalis.
Orthochamosite, aluminosilicate of Mg and Fe.
Ferriberthierine, aluminosilicate of Mg and Fe.
Septeantigorite, aluminosilicate of Mg.
Septekämmererite, aluminosilicate of Mg, Fe, and Cr.
Kimzeyite, a zirconiferous garnet.

SILICATES WITH OTHER ANIONS

Hsianghualite, $Ca_3Be_2Li_2Si_2O_{10}F_2$.
Canasite, silicate and fluoride of Ca and Na.
Birunite, silicate, sulphate, and carbonate of Ca.
Delhayelite,
$(Na,K)_4Ca_5Al_6Si_{32}O_{80} .$
$3(Na_2,K_2)(Cl_2,F_2,SO_4)$.
Baotite, silicate and chloride of Ba, Ti, and Nb.

ADDENDA

Benstonite. F. Lippmann, 1961. Naturwiss., vol. 48, p. 550 (Benstonit); preliminary note in Fortschr. Min., 1961, vol. 39, p. 81. A rhombohedral carbonate from a baryte mine in Hot Spring Co., Arkansas, U.S.A., has unit-cell contents $3[Ca_7(Ba,Sr)_6(CO_3)_{13}]$. Named after Mr. O. J. Benston. The name is unfortunately near bentonite.

Betpakdalite. L. P. Ermilova and V. M. Senderova, 1961. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 90, p. 425 (Бетпакдалит). Near $CaO . Fe_2O_3 . As_2O_5 . 5MoO_3 . 14H_2O$; perhaps essentially an arsenomolybdate of Ca and Fe, as minute lemon-yellow crystals in a muscovite-quartz greisen from the oxidation zone of the Karaoba tungsten deposit (Central Kazakhstan).

Eardlyite. Author? Filer's C 15 Mineral Catalog, Redlands, California, 1961. A dull blue-green massive mineral from Utah is believed to be $(Ni,Zn)_6(Al,Fe)_2CO_3(OH)_{16} . 4H_2O$, the nickel-zinc analogue of hydrotalcite.

Hallimondite. K. Walenta and W. Wimmenauer, 1961. Jahresheft geol. Landesamt Baden-Württemberg, vol. 4, p. 21 (Hallimondit).

Yellow crystalline crusts from the Michael vein, Weiler bei Lehr, Schwarzwald, Germany, contain Pb, U, and As; they give an X-ray powder photograph (not quoted!) near that of parsonsite, and are presumed to be $Pb_2UO_2(AsO_4)_2.nH_2O$. Named after Dr. A. F. Hallimond of London. Final acceptance of this as a valid species must await publication of the X-ray data, particularly as there is no quantitative chemical analysis (cf. Bull. Soc. franç. Min. Crist., 1961, vol. 84, p. 100, recommendations of the Commission on New Minerals of the International Mineralogical Association).

Halurgite. V. V. Lobanova, 1960. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 135, 173 (Галургит); abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 448 (Галургит, halurgite). Mentioned as a new mineral accompanying strontioborite (q.v.) without any description.

Jaffaite. J. Paclt, 1953. [Israel Expl. Journ., vol. 3, p. 242]; abstr. M.A. **15**–136. A gum-resin found in calcareous aeolian rock, and believed to originate from a species of Pistacia. From the plain of Sharon, Israel.

Nifontovite. S. V. Malinko and A. E. Lisitsin, 1961. Доклады Акад. Наук СССР (Compt. Rend. Acad. Sci. URSS), vol. 139, p. 188 (Нифонтовит). $CaB_2O_4.3\frac{1}{2}H_2O$, small anhedral grains in skarn deposits in the Urals. Named after the geologist P. V. Nifontov (П. В. Нифонтов.)

Silicorhabdophane. E. I. Semenov, 1959. [Матер. мин. Кольск. полуостр., no. 1, p. 102]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 444 (Силикорабдофанит, silicorhabdophane). Spherulites in a pegmatite from the Lovozero massif give a powder photograph near that of rhabdophane but contain much SiO_2; near $(Ce,Al,Fe)(P,Si)(O,OH)_4.H_2O$.

Silicosmirnovskite. E. I. Semenov, 1959. [Матер. мин. Кольск. полуостр., no. 1, p. 102]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 446 (Силикосмирновскит, silicosmirnovskite). Massive and metamict material in a pegmatite from the Lovozero massif is formulated $(Th,Ln,Ca)_3[(P,Si)(O,OH)_4]_4.4H_2O$, but contains only 3% P_2O_5, and is not obviously related to smirnovskite (21st List); a doubtful species.

Sulphate-monazite. A. A. Kukharenko, A. G. Bulakh, and K. A. Baklanova, 1961. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), vol. 90, p. 373 (Сулфат-монацит). $(Ce,Ca)(P,S)O_4$, with some Fe, Th, and H_2O, occurring as small nodules in a carbonatite in the Kola peninsula; the powder pattern is close to that of monazite, the refractive indices considerably lower. Named from the composition.

An unnecessary name; there is only 3% SO_3, and sulphatic monazite would have been a better term.

Titanorhabdophane. E. I. Semenov, 1959. [Матер. мин. Кольск. полуостр., no. 1, p. 102]; abstr. Зап. Всесоюз. Мин. Общ. (Mem. All-Union Min. Soc.), 1961, vol. 90, p. 445 (Титанорабдофанит, titanorhabdophane). Spherulites from a pegmatite near Nepkha in the Lovozero massif contain 48% Ln_2O_3, 13% TiO_2, 9% SiO_2, 15% H_2O, and only 3·6% P_2O_5, but are regarded as a member of the rhabdophane group on the ground of a certain resemblance in the powder patterns. An unsatisfactory name.

Weilerite. K. Walenta and W. Wimmenauer, 1961. Jahresheft geol. Landesamt Baden-Württemberg, vol. 4, p. 29 (Weilerit). White earthy crusts of microscopic rhombohedra with mimetite and adamite contain Ba, Al, SO_4'', AsO_4'', and H_2O; they give a powder pattern (not quoted!) similar to that of the beudantite group, and are presumed to be $BaAl_3AsO_4SO_4(OH)_6$, the barium analogue of svanbergite. Named from the locality, the Michael vein, Weiler bei Lehr, Schwarzwald, Germany. Cf. note under Hallimondite, this List.

Widenmannite. K. Walenta and W. Wimmenauer, 1961. Jahresheft geol. Landesamt Baden-Württemberg, vol. 4, p. 22 (Widenmannit). Yellow tabular orthorhombic crystals with cerussite and galena from the Michael vein, Weiler bei Lehr, Schwarzwald, Germany; a carbonate of Pb and U. X-ray powder data (not quoted!) differ from all known uranium carbonates. Named after J. F. Widenmann (1764–1798), who first discovered uranite in the Schwarzwald. Cf. note under Hallimondite, this List.

Wismutantimon. A. Volborth, 1960. Neues Jahrb. Min., Abh., vol. 94, p. 140. An unnecessary name for a bismuthian antimony from Viitaniemi, Eräjäarvi, Finland. [M.A. **15**–134.]

BOOK REVIEWS

ROBERTSON (R. H. S.). *Mineral Use Guide or Robertson's Spiders' Webs.* London (Cleaver-Hume Press), 1960. 44 pp. ($7\frac{1}{2} \times 7\frac{1}{2}$ in.) including 32 diagrams. Price 21*s*.

This rather unusual book is a collection of 32 diagrams designed to indicate the industrial uses of some 50 selected mineral substances. Each diagram is designed like a spider's web filling an empty window frame, the mineral (or rock) name occupying a central circle enclosed in concentric rings showing the properties, grades, treatment processes, or reactions that determine the end uses shown between radial lines extending to the frame. Although the diagrams have a common pattern this lends itself to variation to suit the different requirements for individual minerals. The substances included are mainly non-metallic industrial minerals, especially those often used as fine powders, the preparation of the diagrams having been sponsored originally by the powder technology group of the German Engineers' Association. They comprise agate, alumina or corundum, asbestos, baryte and witherite, bentonite, calcite and aragonite, calcium montmorillonite, diamond, diatomite, dolomite, feldspar, fluorite, garnet, gypsum and anhydrite, igneous rocks, iron oxides, kaolin, lithium minerals, mica, monazite and bastnäsite, olivine and serpentine, palygorskite, peat, quartz, sepiolite, slate, talc, titanium dioxide, tobermorite, vermiculite, and zircon.

Being diagrams made entirely of words and chemical formulae they summarize a great deal of information, rather like paragraph headings, some well-known or self-explanatory, but others will prompt further inquiry, especially as space has not permitted the inclusion of precise data on properties, availability, and prices, the factors that really determine the uses of minerals. The uses indicated are those of synthetic as well as natural minerals, and thus there is an unexpected diagram for tobermorite, based, one supposes, on limestone and sand, and the diagram for titanium dioxide, specified as anatase and rutile, does not indicate that these are largely prepared from ilmenite, a major industrial mineral that is not mentioned. The baryte–witherite diagram might suggest that witherite is the principal mineral raw material, which is certainly not the case. As the author has incorporated all the uses he knows, important and trivial, direct and indirect, the general effect is to suggest an endless variety of uses and possible uses that engineers and salesmen may hope to exploit. T. D.

MAUCHER (A.) and REHWALD (G.). *Bildkarten der Erzmikroskopie.* (Card index of ore photomicrographs.) Frankfurt am Main (Umschau-Verlag), 1961.

The aim of the card index of ore photomicrographs is to give a comprehensive survey of all the typical microscopic features of ore minerals, using polished sections prepared by the Rehwald machine. The first set of 104 cards has recently been published; subsequent sets are to follow at quarterly intervals until within a few years the planned number of about a thousand cards has been reached. Realizing that only a few selected institutions are able to establish large reference collections of polished sections of ore minerals, the authors claim that—with certain limitations, of course—a similar service may be rendered by sets of typical ore photomicrographs.

The card index is subdivided into three main sections: general, systematic, and technical. The first part is to deal, in a purely descriptive way, with features and faults of sample preparation and preservation as well as with mechanical, optical, and morphological features of ore minerals and mineral aggregates. There are three sub-sections in the systematic part: Survey of the ore minerals on the lines of 'Dana's System of Mineralogy'; Microscopic features of typical parageneses of ore minerals; and Microscopic features of typical ore deposits. The third, technical part deals with the application of ore microscopy to problems of ore dressing and metallurgy.

The authors emphasize that publication of cards does not follow entirely the arrangement outlined above, but allows for cards of different main sections to be published simultaneously. The first set of 104 cards now available contains a clear survey of textures of ore minerals as well as cards on native iron, argentopyrite, the pyrrhotine–valleriite paragenesis, and typical photomicrographs from the Corbach and Marienberg ore deposits of Germany. Each card shows, on its upper half, either one 110 × 170 mm. photomicrograph or, in cases where a specimen is illustrated both in plane polarized light and under crossed nicols, two 110 × 83 mm. photomicrographs. The quality of polished sections and photomicrographs is excellent. Explanations of the illustrations are given in English, French, Spanish, Russian, and German. A sliding scale serves to locate points on the illustrations corresponding to x and y co-ordinates, which are given, according to the magnification used, in microns or millimetres. Thus, immediate determination of grain size is easily possible. Groups of cards dealing with a certain subject, for

instance 'pits', 'anisotropy', 'cellular texture', 'native iron', are followed by a 'text-card' with a more detailed description of the sections concerned in English and German. The price is DM 0.75 per photo-card, DM 0.45 per text-card. These prices are reduced by 10% for University departments and academic staff, by 15% for students.

The great value of this unique publication is self-evident and does not need further appraisal. Ore-microscopists will welcome the card index as a high-quality source of reference, and university staff will find it a great help in teaching. Economic geologists and mineralogists will appreciate the straightforward and clear approach, which provides an excellent introduction for research workers less well acquainted with the subject matter. Ore dressing workers and metallurgists will be able to use the card index for the solution of their problems without having to go into details of ore mineralogy. The authors should be warmly congratulated on this first part of a very fine piece of work.

A. F. H.

Mendelsohn (F.), editor. *The Geology of the Northern Rhodesian Copperbelt*. London (Macdonald & Co. Ltd.), 1961, xvi+523 pp., 185 figs. Price 84*s*.

Twenty-three authors have contributed to this comprehensive volume. Part 1 provides a general account of the physiography, stratigraphy, structure, metamorphism, and ore deposits of the Copperbelt together with a history of mineral exploration and an account of the methods employed. Part 2 gives detailed descriptions of the individual deposits. In addition to synthesizing the considerable volume of published work on the subject the authors draw extensively on material from unpublished company reports.

The ore bodies occur in a variety of host rocks—shales, quartzites, impure dolomites—belonging to the Lower Roan Group of the Katanga system. The common primary sulphides, which are moulded onto and replace the rock-forming minerals, show the paragenetic sequence pyrite–chalcopyrite–bornite–chalcocite. Covelline, digenite, linnaeite, carrollite, cattierite, pyrrhotine, melonite, scheelite, molybdenite, uraninite, brannerite, and coffinite are reported in subordinate amounts. The remarkable zonal distribution of the principal sulphides and its relation to facies changes is described and discussed but it is made clear that the details have not yet been fully established for all deposits.

Supergene alteration is extensive and persists to considerable depths.

Malachite, cuprite, chrysocolla, tenorite, native copper, and cupriferous vermiculite are among the minerals produced. While the effects of leaching and oxidation are readily recognizable the extent of secondary sulphide enrichment is much less obvious. Chalcocite and covelline are clearly in part supergene: how far bornite has a similar origin is uncertain.

In the discussion of the origin of the deposits more attention is paid to the close association of ore with sedimentary features of the host rocks and to the lack of obvious structural controls, both suggestive of a syngenetic origin, than to the mineralogical and geochemical characteristics, which seem more easily explicable in terms of hypogene mineralization. However, the conflicting evidence from different mines is clearly set out and the contributors are not unanimous in the conclusions they draw. There is evidently scope for much further research, particularly in the study of the Katanga basin on a regional scale and to establish the extent of supergene sulphide enrichment in individual deposits. J. H. T.

Ramdohr (P.). *Die Erzmineralien und ihre Verwachsungen*. 3rd edn. Berlin (Akademie-Verlag), 1960, xi+1089 pp., 637 figs. Price (bound) DM 88.00.

The appearance of three editions at 5-year intervals is an indication of the importance of this work for the now rapidly extending study of polished sections. This third edition makes its welcome appearance almost at the same time as the 'Festband' (Neues Jahrb., Abh. 94, 1960) offered to the distinguished author on his 70th year.

The book has been substantially enlarged (by about 200 pp. and 94 figures) while retaining fairly closely the arrangement of the 2nd edition. The general part (249 pp.) begins with a classification of the ore-deposits according to their geological origin (29 pp.): A, meteorites; B, magmatic series (abyssal–volcanic); C, sedimentary series (including mechanical aggregates, chemical precipitates, coal and oil, oxidation and cementation zones, together with a paragenetic table of ore-minerals (6 pp.); D, the metamorphic series (38 pp.). Ore minerals are perhaps more sensitive to metamorphic alteration than the silicates, and the study of these changes will no doubt play an increasing part in the interpretation of polished sections. This section provides a review of the extensive material already available, with an outline of the logical development of these studies; special importance is attached to examples of progressive

local metamorphism in ore-containing rocks, where the changes in the ore-minerals can be correlated with the well-known sequence of alteration in the transparent rock-forming minerals. The very early rearrangement of some sulphides, &c., offers special difficulties, but also special sensitivity as an indicator. The remainder of this section is a detailed study of the intergrowths (not forgetting the great technical importance of these structures for the mining industry); 172 pp. are illustrated by reference to many photographs (to avoid duplication, the photographs in this book carry explanatory notes which are not repeated in the text). The appearance of the grain itself (twinning, zoning, inclusions, &c.) is first illustrated; then come the intergrowths, which are commoner, more varied, and sometimes even more difficult of interpretation than the familiar 'eutectic migmatitic–symplectic-graphic' varieties of texture in the rocks. The Schneiderhöhn classification of textures is followed throughout although 'the names are too much borrowed from petrological nomenclature'. The relation of texture to the mode of origin is examined for many types of crystallization, often with inclusions. Primary crystals, colloidal growths, sediments, are illustrated with excellent photographs. Then decomposition: whether by paramorphism, unmixing (in detailed relation with the crystal symmetry), or more generally by chemical changes including oxidation and cementation. Radioactive haloes, usually only identified by transmitted light, are now illustrated in polished sections under vertical illumination.

The systematic part (819 pp.) contains the well-known descriptions of the ore-minerals, with additional species and recent optical and other data. There is naturally an extension of the range of variation [it is not known how far this may be due to the unnecessarily low standard of accuracy in some recent measurements (reviewer)]. X-ray data are given, but the author comments that deceptive similarities are common among the ore-minerals, so that complete descriptions should be required for identification. The author's descriptions of the uranium minerals are particularly welcome. Even though the references have been carefully limited there are now 653 items, with 14 more on p. 267.

A. F. H.

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